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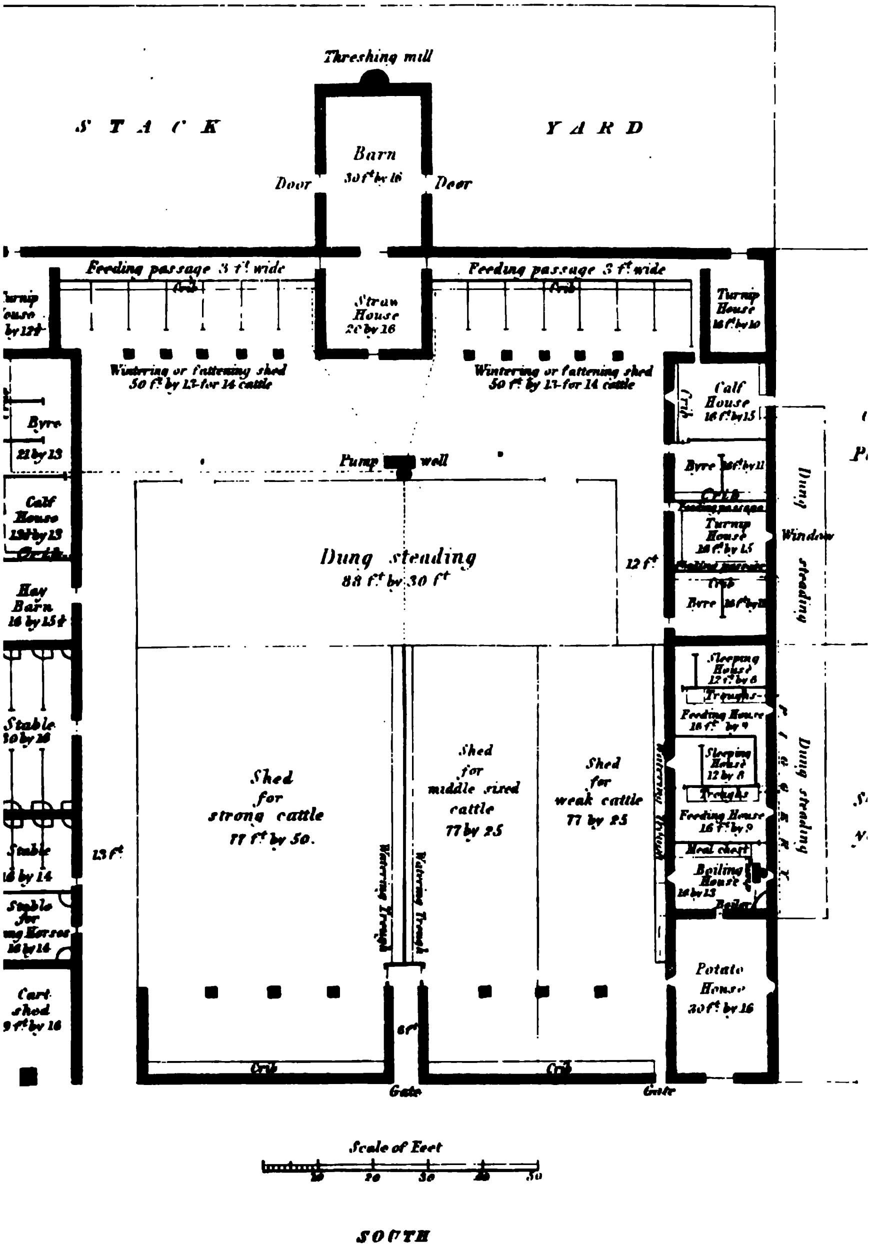
Frontispiece.

PLAN
of
FARM OFFICES
by
Andrew Henderson



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THE
PRACTICAL GRAZIER;
OR,
A TREATISE
ON THE
PROPER SELECTION AND MANAGEMENT
OF
LIVE STOCK;
WITH CURES AND PREVENTIVES FOR THE MOST PREVALENT DISORDERS THAT ATTEND THEM:
LIKEWISE
A PROPER SYSTEM OF MANAGEMENT POINTED OUT,
FOR
GRAZING FARMS OF DIFFERENT SOILS,
IN VARIOUS CLIMATES AND SITUATIONS,
CONTAINING
SEVERAL MODES OF IMPROVING WASTE LANDS, DRAINING, AND IRRIGATING;
WITH USEFUL HINTS TO THE LANDLORD AND PRACTICAL GRAZIER.

By ANDREW HENDERSON,
LAND-SURVEYOR AND VALUATOR,
MONTROSE.

Illustrated by Fourteen Engravings.

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LONDON.

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481.

ENTERED AT STATIONERS HALL.

BIBLIOTHECA

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TO

HIS GRACE THE DUKE OF ARGYLE,

THE FOLLOWING TREATISE

ON THE

PROPER SELECTION AND MANAGEMENT

OF

LIVE STOCK, &c. &c.

IS,

BY PERMISSION,

MOST RESPECTFULLY DEDICATED,

BY HIS GRACE'S

MOST HUMBLE AND OBEDIENT SERVANT,

THE AUTHOR.

ADVERTISEMENT.

From the Author's not being originally known to many of his subscribers and to the public in general, much might be thought necessary to be here stated, concerning the opportunities he has had of acquiring experimental knowledge, to qualify or entitle him to write on the subject contained in the subsequent pages of this volume, and more particularly, as he now assumes the title of land-surveyor and valuator; it being well known how ignorant, in general, gentlemen of such professions are with regard to the topics in question, although it must be allowed, that they are inseparably connected, particularly the latter. But the Author begs leave to remark, that it was from the idea of having acquired a pretty general and extensive knowledge, by experience, of the subject alluded to, which induced him to devote a few years study and practice, to qualify and entitle him to receive the above appellations. Let it therefore suffice for the present to state, that his father was well known to be one of the most extensive and spirited farmers in Dumfries-shire, with whom he may be said to have served his apprenticeship, by first having undergone all the drudgery of a common grieve; then promoted to commander-in-chief; and, after his father's decease, succeeded him, and consequently became an extensive farmer himself. Such opportunities at home, combined with repeated and unlimited ones abroad, were the entire foundation of the inducements for bringing forward the present treatise to public inspection, and ranking the Writer among the list of authors. Such facts as above stated are too well known to many of the Author's subscribers, to require any further comment; and to such as may not have had opportunities to the same effect, he must leave them to judge, after a perusal of this treatise, and reducing some of its remarks to practice, whether it has been written by a mere scientific land-surveyor or valuator, or by a thorough-bred farmer and practical grazier.

The Author has here further to apologize to his numerous and high respectable subscribers for the delay which has taken place in the publication of this work, some years having elapsed since he had the honour of receiving many of their signatures. Such a delay, however, has entirely proceeded from the time demanded from his present professional acquirements; and as he was apprehensive that he had still to *learn*, and not having lost sight of research, and a perusal of the manuscript, he therefore concluded that time protracted was not altogether lost, and that such would ultimately prove rather gain than loss to his highly esteemed benefactors. That the volume now before them may compensate for all bypast neglect or transgressions, is the most ardent wish of the Writer.

Montrose, 26th June 1826.

PREFACE.

SHOULD an apology be deemed necessary for writing a Treatise on the Management of Live Stock, with some Practical Hints on Agriculture, after so many valuable works of the kind having appeared in print, some of which have met with general applause, I beg leave to submit to the judgment of an impartial reader the following reasons for making this attempt.

Among the various treatises which have of late years been offered to the public respecting the improvement and management of land in general, there is a very small proportion of them on the management of live stock, when compared with the numerous volumes on agriculture. Whether the neglect of attention to the one has proceeded from a decided preference of the other, or from a superior judgment, it may not be easily determined; but I should rather suspect the former, seeing that great judgment has been of late years displayed in the improvement and management of domestic animals in Britain, particularly neat-cattle and sheep. Yet this has been very partially taken notice of by authors; which is certainly a great omission, and a check to their unwearied and strenuous attempts in endeavouring to bring farming to a state of perfection: for, according to the most approved system of it, there is such a connexion between the cultivation of ground and the breeding, rearing, and fattening of domestic animals, that the one cannot be neglected without injury to the other. Although some authors have connected these inseparable subjects, in their different volumes, while others have treated fully upon them separately, yet it does not appear that there is any upon practical management, as particularly descriptive of the most profitable kinds to be kept on the different soils in various climates of Great Britain. It is evident, however, that some able writers have drawn a very just picture of the characteristic marks of the various breeds of live stock, and have likewise given a very distinct view of the proper selection and management of the kind of stock on which they had been peculiarly accustomed to make improvements and satisfactory experiments, most of which have been particularly confined to England. But such does not extend to a general benefit, as it must be allowed by all, that some kinds of stock will thrive and do well on some soils, in some climates, while they would starve upon others; as likewise the treatment necessary and sufficient for one kind of stock will be nothing like adequate to that which may be quite indispensable for another. The same rule holds good here as that universally known to be applicable to agriculture, viz. that plants will not thrive equally well upon the same kinds of soil in different climates, neither is the same management always commendable upon the same kind of soil, but must vary according to climate and other local advantages. The validity of such simple facts has of late years been too clearly substantiated, I am sorry to say, by too many of our theoretical graziers and agriculturists, would they only have the candour to confess it. It is therefore the design of this treatise to make an attempt at obviating some of those mistakes which have been so recklessly and thoughtlessly committed, by simply stating facts founded partly upon an extensive experience for upwards of twenty years, and partly from unwearied exertions, in supplying defects by making notandums of satisfactory experiments made by gentlemen of sound judgment and long experience; to whom I made it my business to get introduced during many repeated travels through almost every corner of England, Scotland, and Wales. With the flattering hope that such collected ideas as I am now about to commit to the press may at no distant period prove beneficial to at least some of the numerous and highly respectable supporters of this work, if not to the public in general, I set about it some years ago with no ordinary zeal, knowing that such a task could not be accomplished, however fruitless it might prove, without some glimpse of so cheering a ray. At the first outset, however, I was resolved not to split upon the same rock with many other writers on this subject by presenting a swollen volume, with long theoretical threads only fit to be used by refined gentlemen with bottomless purses; it being my constant study to spin a short practical thread, adapted to common use. I have likewise guarded against wearying the patience of my reader with long reviling 'digressions against other authors, who having perhaps paid the debt of nature, are consequently deprived of being able to lift up their pen in self-defence. Many of the works of such writers I have read with great impatience, and can scarcely here forbear mentioning names, and telling them that their primary object for entering the list of authors seems to have been an ardent wish to raise themselves in the estimation of the public, by endeavouring to throw a stain upon the memory of those who were in their day useful members of society. I have nevertheless had occasion to differ in opinion from some authors, as may be noticed in the subsequent pages, but I shall leave the reader, if he is possessed of experimental knowledge of the subject in dispute, to judge candidly of such opinions that may so appear.

This book will probably be taken up and examined by some through curiosity, or, as it were, for pastime, not being so situated at the time to have recourse to a treatise on a more lively subject, as their taste might style it; but immediately on the perusal of the title page, their exclamation will be, Oh! this is a treatise on live stock, and hints on agriculture, a subject completely hackneyed and overdone; but as a killing of time I shall endeavour to wade through it some way or other. But as an encouragement to such readers to bestow a little time, without the idea of killing it, on the perusal of this volume, I must be permitted to remind them that although there are a great many volumes on the subject, the greater part of the substance of which has been found by experience not to answer when reduced to practice, yet that some useful hints are to be obtained from most of them, must certainly be allowed, and that it is not an easy task to point out a system of farming founded on principles capable of universal application. On the other hand, such readers may probably think that enough has been written on the subject, and that quite to the point, consequently a publication of this nature was not at all necessary, and therefore cannot prove beneficial to the public. That there have been of late some very satisfactory treatises of a similar nature laid before us, and those by men of long experience and undoubted ability, few will doubt; several of which I have repeatedly referred to for the sake of illustration. But allowing such writers a just portion of merit for their labours, they must still be supposed to possess a portion, however small, of the natural imperfections of man, and cannot therefore have entirely exhausted the subject. Even the changes effected by lapse of time, founded upon practical experience, some of which I have myself bought at a very dear rate, may of themselves be interesting and prove of some utility to the public. Such are the inducements, connected with an earnest request by many of my respectable friends and subscribers, which call me forth on the present occasion to rank in the list of authors: as to my ability and fitness for the task, it becomes me to be silent and patiently wait the impartial judgment of the public.

There is a second character into whose hands this treatise may fall, viz. the critic. I would recommend it to him to be merciful, and, should he be an author himself, first to pluck the beam out of his own eye, before he touches the mote that is in his neighbour's. If a critic for amusement, or from a wish to raise himself in the estimation of the ignorant at my expense, I would advise him to be aware where he introduces the subject, as fortunate it is for those who have their sentiments so openly exposed to public censure, that now and then unexpectedly an advocate starts up to vindicate their cause, and turn such contemptible wretches into ridicule and an object of disgust. But should the criticism proceed from pure motives, and that I may have suggested something that might tend to mislead even one individual, which I may have done through ignorance, I shall esteem it as a mark of genuine friendship in any of my readers to point out to me any such error or errors; which I shall most readily correct and make public; I was going to say, in the second edition of this work; which at present would be the height of vanity for me to flatter myself with, not being certain of such a favourable reception of the first. But in order that I may receive a palliation of censure for some errors that no doubt may make their appearance, I would request a perusal of the following lines.

> Whoever thinks a faultless piece to see,
> Thinks what ne'er was, nor is, nor e'er shall be.
> In every work regard the writer's end,
> Since none can compass more than they intend;
> And if the means be just, the conduct true,
> Applause, in spite of trivial faults, is due.

But there is likewise a third character which no doubt will give the book at least one reading, viz. one eager in acquiring additional knowledge in the management of live stock and other agricultural pursuits. Let such a person not expect too much, lest he be disappointed; but let his expectation be restricted to the hope of meeting with one or two hints that may be equal in value to the time spent in reading, and the original cost of the volume; which, if I am at all acquainted with the subject, ought to be the case.

As to elegance of style, that I have no pretensions to, neither is it necessary to make such ideas explicit. And although I have mentioned in the title-page that cures and preventives will be given for the most prevalent disorders that attend the domestic animals of which I have here treated, I trust that it is not expected that I am to enter into the minutiæ of the veterinary school. The method pursued in this department is simply giving a catalogue of the most prevalent diseases, with the nature and symptoms, and recommending either such preventives or methods of cure as I have discovered from experience to be successful, or such as have been found to be entitled to respect: and in cases doubtful or difficult, it would be advisable to take a more extensive view of the veterinary school, or, if convenient, call the assistance of some practical veterinarian. Throughout the subsequent pages it was my primary study to keep in view practical utility, and to avoid the insertion of all speculative notions, " as a burnt child dreads the fire;" still I am well aware that what I have stated or suggested, however anxious I may have been to render it of service or benefit, will be strongly opposed by the illiterate and prejudiced. But from the candid and impartial I must crave a fair hearing; and should the arguments used not be thought sufficiently evincing, I shall then appeal to facts and just experiments.

INTRODUCTION.

REMARKS UPON THE PLAN OF OFFICES.—(*Inserted as a Frontispiece.*)

The farm yard, in the plan, comprehends a space of 145 feet square within walls; no notice being there taken of the thickness of the walls, as this must vary according to the height and weight they have to support.* If much accommodation is wanted for hay and grain, the whole of the buildings, with the exception of the wintering sheds on the south, must be made one and a half or two stories high; the lofts above the turnip and wintering sheds on the north being appropriated for the grain, and those above the stables and byres, &c. for hay and straw: however these matters must be entirely regulated according to the size of the farm and kind of accommodation required. When observing the convenience afforded by the connexion which one apartment has with another, I trust that the arrangement in the plan will be approved of; but should the apartments be too numerous or not properly proportioned, they must be altered suitably to the quantity and kind of stock kept. The dung steadings marked in the plan must all be sunk four or five feet below the surface, with cart-ways attached, of such a declivity as to admit the carts to remove the manure. The sinking of these steadings not only preserves the manure in a proper state, but prepares reservoirs to receive all the urine from the surrounding apartments, which must be conducted by either open or covered drains (of a suitable declivity) as may be found most advisable. Such reservoirs ought to be made retentive in the bottom and walled upon the sides: should the number marked in the plan be thought too many, perhaps the one in the centre of the court may be sufficient with the assistance of the open sheds attached to it, receiving the manure of their most contiguous apartments, particularly that one in front of the stables. But if the quantity of stock to be kept and straw consumed is large, the number of dung-steadings specified will be found very convenient, and not more than necessary; in which case the manure in such apartments as are connected with steadings must be thrown through the back windows leading to them. All the cattle may be watered in the house, if required, by wooden troughs or tubes, moveable where necessary, communicating from the pumps to where required. Thus the cribs and troughs in the byres and swine houses upon the east side of the square may be watered by the dotted line representing a trough leading from the well in the boiling-house: and in the same manner will the dotted lines joined with the pump in the court water the cribs with which they are connected. The thrashing mill should be so placed in the barn as to throw the straw into the straw-house; the doors in the barn, turnip-houses, and potato-house should be as wide as to admit a cart; and it will be of great advantage if the floor of the latter house is sunk a few feet below the surface. In the sheds and byres in the plan two feet wide are allowed for cribs, six feet for the length of the stalls, three of a passage behind, and from seven to eight feet wide for a pair of oxen or cows. These dimensions are suitable for cattle of a medium size, but must be regulated according as the kind of stock kept varies in this particular. As to the length of a stall, it should be such, as the animal's hind feet when standing in it are placed upon the brink of the narrow channel or 'grip' behind, which holds the manure. The whole beds or stalls should be so constructed and of such a declivity as the animals may lie clean and dry, being two great promoters of health, a circumstance of the utmost importance. This, however, will in some measure depend upon keeping up a regular temperature, as extremes of heat and cold tend much to generate disease; consequently the doors and windows of such apartments should be so constructed as to shut or open as the season of the year or state of the weather may render necessary.* There seems to be a difference of opinion regarding the proper degree of heat requisite for a fattening shed or byre: some prefer keeping cattle rather cool, others say that they cannot be kept too warm, as the more that perspiration is kept up the quicker the cattle will fatten. But I should suppose the majority of experienced feeders will join me in saying, that there is a medium to be here observed, as in many other cases, and that cattle kept so warm as rather to encourage than check that natural perspiration which thriving cattle are subject to, will, in general, be soonest ready for market; and that such cattle as are not intended to be made fat, but are daily exposed to air and exercise, must be kept rather cool than warm.

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* The subdivisions in all the different apartments ought to be made of wood, so that they can be altered with ease and at little expense, as necessity or a change of system may require: those in the piggery may be made no higher than what will keep the pigs separate, and those in the sheds and byres of such a height as will admit of the straw and turnips being put over them into the cribs.

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* It may be observed that the fattening sheds in the plan have neither doors nor windows, but are all open between the pillars behind the cattle. Such sheds, however, will frequently be found warm enough for wintering cattle, particularly when so much surrounded with buildings and facing the sun. But should such sheds be found too cold for fattening, the spaces between the pillars may be filled up in a temporary manner when required for that purpose; and the necessary opening of the doors in the turnip sheds will cause a sufficient current of air for ventilating the house.

In the stables of the plan in question, 5 feet 4 inches are allowed for the width of each stall, and from 9 to 10 feet in length, including the space occupied by the square box in the one corner for holding oats, &c. and the round upright rack in the other for holding hay, &c. But such dimensions may necessarily be varied according to the size of the horses kept: a stall should just be as wide as to allow the horse intended to stand in it to turn round with ease. A dry clean bed is quite indispensable for a horse; which its formation will in a great measure tend to regulate. The floor of stalls ought therefore to be made of sound materials, founded upon a dry foundation, with such a declivity as quickly to remove all urine, &c. into conducting open or covered drains connected with the general reservoir.* The formation of the racks and mangers is likewise another essential point to be observed in the proper fitting up of a stable. The common method of extending them quite across the stalls is certainly attended with much loss and injury; the hay seeds, which are in some places very valuable, are not only wasted, but from the formation of the rack not being perpendicular they are apt to get into the horse's eyes and ears, which is sometimes attended with dangerous consequences: besides, by this method, much more hay can be stuffed into the racks than what is necessary at one time; (and which is too prevailing a practice;) consequently much is pulled down and wasted. But such evils are removed by the new approved system of putting up racks and mangers, which is executed in the following manner:—The angle upon the upper end of the stall and on the left side of the horse is filled up with a perpendicular rack with a box fixed to the bottom, sparred across so as to admit the hay seeds; as much of the angle may be taken in as will form a rack large enough to hold a sufficiency of hay for a horse one night: on the other side of the stall is fixed a moveable box for holding oats, about 14 inches wide and 18 inches long. (See the corners of the stalls in the plan.) A stable should not be too dark, as it is bad for the eyes of horses; however, light must not be admitted by open windows, but by means of glass. The proper temperature of a stable is no less necessary than that of a fattening byre, although more difficult to hit upon, as it is not so easy to find out the degree of heat necessary for animals daily exposed in various ways to the inclemency of the weather, as for those which may be doomed to stand constantly in the house. However, as warmth is congenial to the horse, he ought rather to be kept in that state than otherwise, although it would not be advisable to extend it to such a degree upon the common daily drudge as upon the more delicate hackney, hunter, or racer.*

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* It is sometimes difficult to remove the urine, particularly from a horse, without giving the floor an improper declivity; but to remedy this evil in well-finished stables, a drain is made down the centre of the stall to within two or three feet of the top, a few inches square covered with a thick plank of wood with perforations in it: the stall must be paved so as to have a descent into this drain, which must likewise have a suitable declivity into the conducting one, which is made to join either with a small grate or not as the principal drains may be covered or open. The perforated plank must be made to take off, so that the drain may occasionally be washed and swept clean out.

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* See more of the above in the chapter on the Management of Horses.

INTRODUCTORY TABLE.

A TABLE *showing Puberty, and the proper age and season for putting both sexes of Live Stock together for propagation; likewise the period of Gestation, Weaning, Castrating; the number of Produce; and when both sexes ought to be stopped from Breeding; also the length of time to which they ought to be allowed to Breed; their usual Lifetime, and Longevity.*

Females.	*Puberty.*	*Proper age.*	*Season.*	*Gestation.*	*Weaning produce.*	*Castrating produce.*	*Produce.*	*Stop Breeding.*	*Stop Breeding by nature.*	*Lifetime male or female.*	*Longevity male or female.*	*Proper time for fattening male or female.*
	Years.	*Years.*		*Months.*	*Months.*	*Months.*	*Number.*	*Years.*	*Years.*	*Years.*	*Years.*	*Years.*
Mare..............	2	4	April or May.	11	6	12, colts.	1 or 2	14	18	20 to 30	47*	
Cow..............	1½	2 to 3	May, June, July.	9	1 to 6	1, male or female.	1 or 2	8	12	14	20*	3, 4, or 5, according to kind of breed.
Ewe..............	1	1½ or 2	Oct. Nov.	5	3 to 4	2, males.	1, 2, or 3†	5 to 6	10	10 to 12	20*	2, 3, or 4½.
Sow..............	6 months.	8 or 9 months.	1st Oct. 1st April, for two litters in the year.	4	6 to 8 weeks.	1, male or female.	8 or 10 and 12.	4 or 5	15	14 to 16	20	6 to 12 months.
Males.				*Number of females 1st season.*	*Number of females 2d season.*	*Number of females in one day 1st season.*	*Number of females in one day 2d season.*					
Stallion..........	1	4	April.	20	30 to 40	1	2 or 3	16	18 to 20			
Bull..............	1 to 1½	3	April or May.	90	30	1	2	8 to 10	12 to 14			
Ram..............	1	2	Oct. and Nov.	50	60 to 100	1 to 2	3 to 4	6	10 to 12			
Boar..............	6 months.	1	1st Oct. 1st April.	8	10 to 12	1	1 or 2	5	18 to 20			

Females.	*Sucking.*	*One year old.*	*Two years old.*	*Three years old.*	*Four years old.*
Mare..............	Filly foal.	Yearling filly.	Two years old filly.	Three years old filly.	Mare.
Cow..............	Quey calf.	Yearling quey or heifer.	Two years old quey or heifer.	Three years old quey or heifer.	Cow.
Ewe..............	Ewe or Gimmer lamb.	Ewe or Gimmer hog.	Gimmer.	Ewe.	Four-shear ewe.‡
Sow..............	She pig.	Shot.	Sow.	Sow.	Sow.
Males.					
Stallion..........	Colt foal.	Yearling colt.	Two years old colt.	Three years old colt.	Horse.
Bull..............	Bull calf.	Stirk or yearling bull.	Two years old bull.	Bull.	Bull.‖
Ram or Tup...	Tup lamb.	Tup hog.	Dinmond tup.	Three-shear tup.	Four-shear tup.¶
Boar or Brawn	He pig.	Boar shot.	Boar	Boar.	Boar.

NUMBER OF TEETH AT DIFFERENT AGES.

	Sucking.	*One year old.*	*Two years old.*	*Three years old.*	*Four years old.*	*Five years old.*
Horses.............	12	12	12	4 horse and 8 foal.	8 horse and 4 foal.	12 horse and 2 under tusks.
Neat-Cattle§......	8	8	6 old and 2 new.	4 old and 4 new.	2 old and 6 new.	8 new.
Sheep..............	8	2 new and 6 old.	4 new and 4 old.	6 new and 2 old.	6 new and 2 old.	

Swine change their teeth when about twelve to sixteen weeks old, at which time the tusks begin to grow.

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* Culley on Live Stock. † Complete Grazier, p. 47. ‡ Sheep take their age from the time of shearing, and not lambing.

§ The age of neat-cattle is likewise known by the wrinkles of the horn: the first appears at three years old, and one for every year after.

‖ Castrated bulls are termed two, three, and four years old steers, and at four years old receive the name of oxen or bullocks. When the females are speyed, they are called cut or speyed heifers.

¶ Castrated tups are termed, when sucking, wether lambs; at one year old, wether hogs; and then two, three, four, or five shear wethers, according to the age

REMARKS ON THE PRECEDING TABLE.

As I conceive the preceding table not to be explicit enough as to the proper distinction of age, among the different kinds of animals there noticed, it may consequently be expedient to annex a few additional remarks on the subject.

HORSE'S AGE.

There are various ways of knowing a horse's age, but that which is most certain is by the teeth. A foal or colt, when foaled, has no teeth, but in the course of a week four appear, which are called nippers or pincers; shortly after follow other four, named separators, and in three or four months the four corner teeth push out; and thus continue the twelve colt teeth in front of the mouth, until the colt is two and a half or three years old,* according as he is kept, when he casts two above and two below, and receives four new pincers, with black deep holes in their extremities. When coming four years old, the four separators are replaced in the same manner by new ones; and at four and a half or five years old the remaining four corner teeth are renewed; and in a short time a black speck appears in the centre of the extremities of these teeth, which being just perceptible, the horse is known to be five years old: during this year four tusks appear behind the teeth, and the appearance of the two under tusks is likewise a sure indication that the horse is coming five years old, notwithstanding that the colt teeth may not be all shed as above remarked. When coming six years old, the holes formerly noticed in the two under pincers fill up, leaving a black spot; and between six and seven the two middle and two corner teeth fill up in the same manner: so that when a horse is seven years of age his teeth are all fully grown, and the "mark of mouth" distinctly seen throughout the whole teeth. At eight the mark will have mostly disappeared, and the teeth will be smooth and even;* after which time it is difficult to ascertain a horse's age. The tusks and situation of the teeth are now the only sure guides. "For the tusks the purchaser must with his finger feel the inside of them from the point quite to the gum. If the tusk be pointed flat, and has two little channels withinside, he may be certain the horse is not old, and at the utmost only coming ten. Between eleven and twelve the two channels are reduced to one, which after twelve is quite gone, and the tusks are as round within as they are without; he has no guide then but the situation of the teeth. The longest teeth are not always a sign of the greatest age, but their hanging over and pushing forward, as their meeting perpendicularly is a certain token of youth. When horses are young, their teeth meet perpendicularly, but grow longer and push forward with age; besides, the mouth of a young horse is very fleshy within in the palate, and

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* From a colt's teeth remaining so long stationary, great impositions as to age are practised, by the jockey calling colts either one or two years old as he finds it to suit his customer: this, however, may be checked in the following manner: "A yearling colt has a rough soft coat, resembling that of a water spaniel, and the hair of the mane and tail feels like flax, and hangs like a rope untwisted;" whereas a colt of two years has a flat coat, straight ears, and mane and tail resembling more a full-grown horse.

† It must be remarked that all horses have not four tusks; indeed a

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mare most frequently has none, sometimes two under ones, and a horse mostly four, but likewise sometimes only two under ones: tusks are seldom full-grown until the horse is six years old, when they are white and sharp; but as he advances in age they get yellow and round at the top. A horse has twenty-four grinders or double teeth, which afford no assistance in knowing the age.

* It is the marks of the under teeth that are above alluded to, as those of the upper ones frequently remain until the twelfth year.

his lips are firm and hard: on the contrary, the inside of an old horse's mouth is lean both above and below, and seems only to have the skin upon the bones. The lips are soft, and easy to turn up with the hand."* Very old horses have generally large tongues, which cause them to foam much at the mouth, particularly when eating oats.

AGE OF NEAT-CATTLE.

It may be observed by the preceding table, that neat-cattle cast no teeth until two years old, but they are in general turned of that age before the first two new teeth appear; and in every succeeding year thereafter until five years old two old teeth are replaced by two new ones, when they are termed full-mouthed; but in fact, they are not properly so until six years old, the two corner teeth being the last that were shed are not fully up until this period. When such marks of distinguishing the age of neat-cattle become uncertain, the horns (of such as have them) will render assistance in most cases, although not always.† At three years old there may be observed small pieces on the tip of the horns, which fall off, being the last part of the original ones; so that they are now completely smooth and new; and about this time a wrinkle or circle is formed at the root of the horn, of which an additional one appears every succeeding year; consequently the age may be ascertained by the number of wrinkles.‡

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* Complete Grazier, p. xxi.

† It is a common practice among cattle-jobbers to risp or file off such wrinkles; which may be easily known, as it disfigures the shape, and leaves a roughness which does not appear upon the natural outside.

‡ There seems to be a difference of opinion whether or not a proper circle is formed the third year, but it is more generally believed that it is, although the following is a striking exception: "Oxen have a tempo-

AGE OF SHEEP.

In the table it will appear that sheep at one year old get two new teeth; it is however in general fourteen to fifteen months before this takes place, and they renew two every subsequent year, until turned of three years old, when they are called full-mouthed. It may also be noticed in the table, that although the teeth of the sheep undergo no change after they are three-shear, to speak technically, yet there are two of the original teeth not changed, which are broad ones in the centre of the others. Some are, however, of opinion that these two are shed also; but the circumstance of hogs losing their broad or middle teeth while put upon turnips, and never getting such properly replaced with new ones, would plainly dictate that these were intended to be stationary from the beginning.*

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raneous set of horns, which give place at three years old to a permanent pair, which produce a circle every succeeding year; so that by counting three years for the point of either of the horns, and a year for each circle, the age is gained." (See Blaine's Domestic Treatise.) Hence an ox with one circle will be four years old, whereas he is more generally termed only three years old.

* I should suppose it almost unnecessary to add that neat-cattle and sheep have no teeth in front upon the upper jaw as the horse tribe have, and that the former chew the cud, but the latter do not.

CONTENTS.

Page
PREFACE vii
INTRODUCTION xv
INTRODUCTORY TABLE xx

CHAPTER I.

HORSES.

Sect. I. Introductory Remarks 1
II. Breeding 9
III. Rearing 10
IV. Treatment after being laid to Work . . . 15
V. On the Diseases of Horses 27
VI. Remarks to Purchasers 62

CHAPTER II.

NEAT-CATTLE.

Sect. I. Introductory Remarks 68
II. On the Soil and Climate best adapted for each Breed, and the Purposes for which they are most suitable . 92
III. On Breeding 102
IV. On Rearing 107
V. On Fattening 120
VI. Most Prevalent Diseases 129
VII. Remarks to Purchasers 160

CHAPTER III.

SHEEP.

Sect. I. Introductory Remarks 162
II. General Remarks on the Soil and Climate best adapted for each Breed, and the Markets for which they are best calculated, with additional Hints for selecting a proper Stock 175
III. Management 177
IV. Diseases of Sheep 192

CHAPTER IV.

SWINE.

Page

Sect. I. Introductory Remarks 237

II. General Remarks preparatory to the Selecting and Proper Management of a Swine Stock 253

III. On Breeding 258

IV. On Rearing 259

V. Fattening 263

VI. Diseases of Swine 264

VII. On the various ways of Preparing Pork for Use or Market 268

CHAPTER V.

GENERAL REMARKS ON BREEDING AND CROSSING DIFFERENT KINDS OF STOCK.

Sect. I. On Breeding 274

II. On Crossing 279

CHAPTER VI.

MANAGEMENT OF GRAZING FARMS.

Sect. I. Grazing connected with Tillage . . . 290

II. Lands most suitable to Neat-Cattle and Sheep . . 294

III. The most Profitable System to be adopted upon a Grazing Farm 299

IV. General Remarks applicable to any System of Grazing 302

V. Remarks relative to the Proper Method of Grazing a Breeding and Rearing Stock . . . 306

VI. Necessary Remarks for the Proper Management of a Fattening Farm 314

VII. A Dairy Farm 318

VIII. On Preparing Hay for Winter Provender . . 328

CHAPTER VII.

ON THE IMPROVING OF PASTURE AND MEADOW LANDS.

Sect. I. Improving Pasture Lands 337

II. Improving Meadow Land 342

CHAPTER VIII.

IMPROVING WASTE LANDS.

Sect. I. Propriety or Impropriety of Paring and Burning . 344

II. Land most suitable for Paring and Burning, the Method of Executing it, and its Advantages . . 351

III. Lands most suitable for the Culture of the Spade, Method of Performing it, and its Advantages . . 357

Page
Sect. IV. Lands which ought to be Improved by the Plough, Methods of Executing and Advantages connected . . 360
V. Sowing with Grass Seeds for Pasture or Meadow . 362

CHAPTER IX.

DRAINING LAND.

Sect. I. Introductory Remarks . . . 366
II. Necessary Implements 368
III. Different kinds of Drains most commonly used . 371
IV. Draining Land Injured by Stagnated Water on the Surface 383
V. Draining Land Injured by Water Lodging in the Soil or under it 386
VI. Draining Sheep Pastures . . . 395
VII. Draining Land-locked Bogs, or such Land where a Declivity cannot be obtained to carry off Water . . 398

CHAPTER X.

IRRIGATING LAND.

Sect. I. Introductory Remarks . . . 402
II. Situations and Soils most suitable . . . 406
III. Water most suitable 408
IV. Proper Season for Irrigating, the most suitable Quantity of Water to be used, and the proper Periods for taking it on and off the Land 411
V. Instruments, Erections, Trenches, &c. necessary for Irrigation 419
VI. General Rules for Preparing Land for Irrigation . 422
VII. Watering Low Level Land near the Banks of a River, &c. 428
VIII. Watering Land upon Hill Sides, or such as may have a Quick Descent, where a Stream is running down the Declivity; either for raising Hay or Pasturing, as the necessity or Situation may best dictate . . . 432
IX. Method of Grazing Land which has been Flooded with Water 435

CONCLUSION 439

DIRECTIONS TO THE BINDER.

Frontispiece to face the title-page.

Plates No.	III. to face	page 1
Do.	III. IV. V. VI.	68
Do.	VII. VIII.	162
Do.	IX.	237
Do.	X.	257
Do.	XI.	366
Do.	XII.	398
Do.	XIII.	428

ERRATA.

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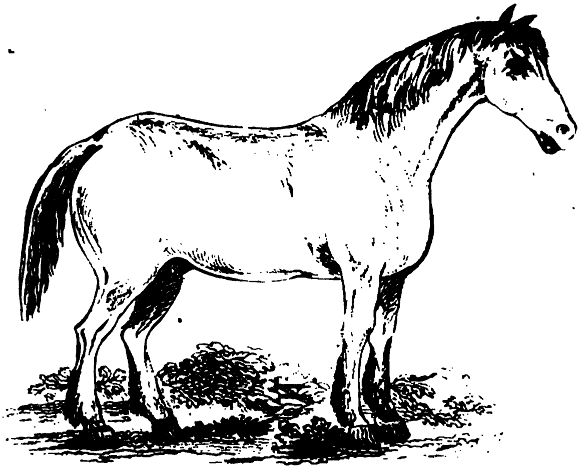
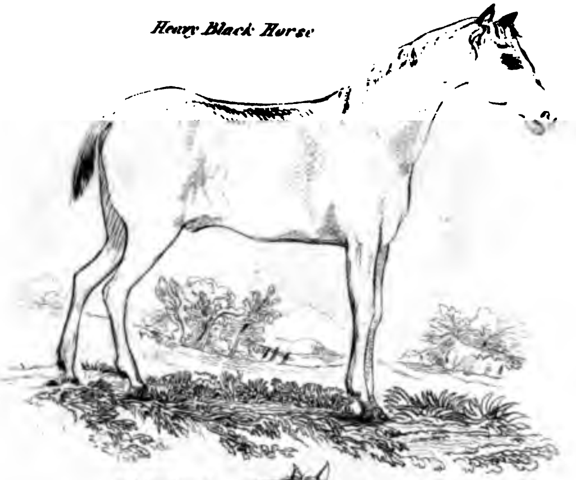
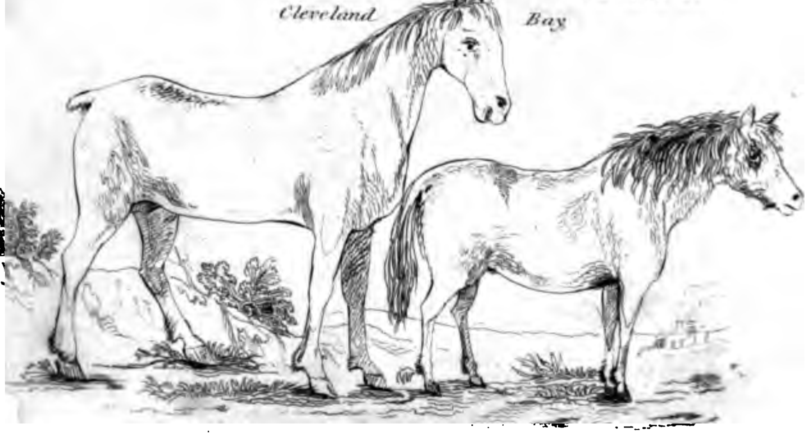
PLATE I.



Heavy Black Horse



Cleveland Bay



Suffolk Punch   *Highland Pony*

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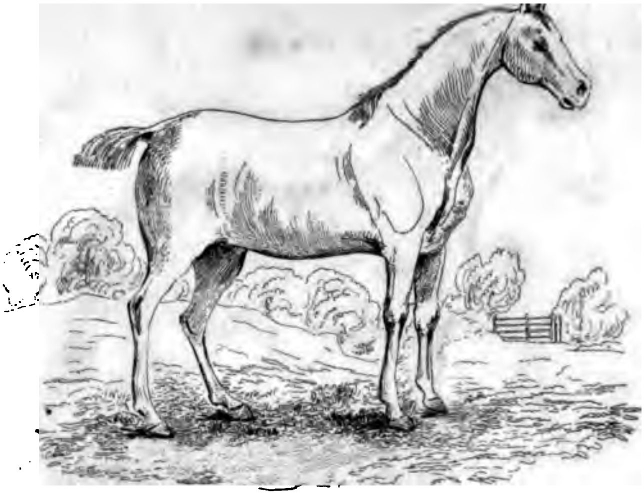
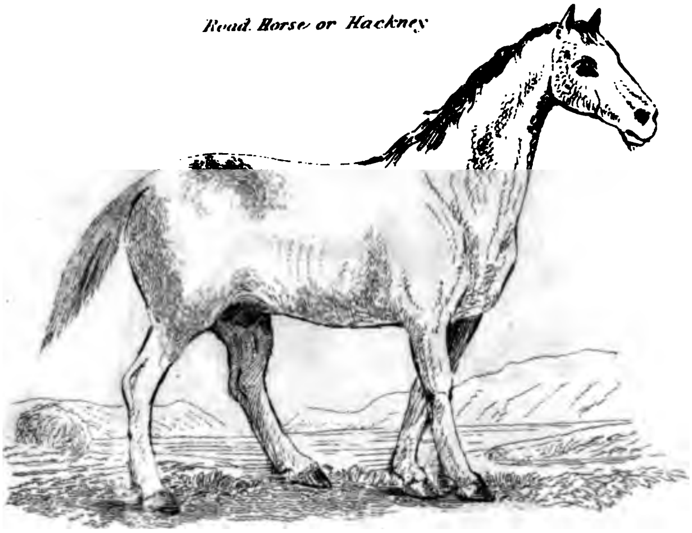
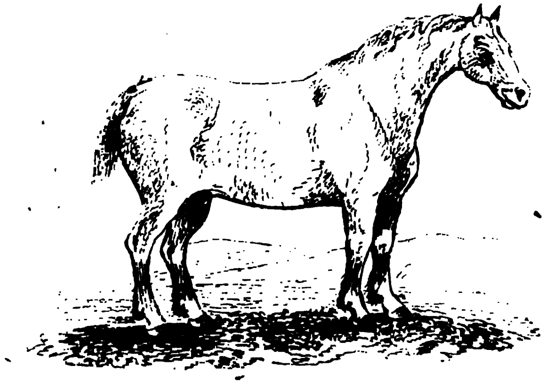


Road Horse or Hackney



Clydesdale Breed



Old English Draught Horse

PRACTICAL GRAZIER.

CHAPTER I.

HORSES.

SECTION I.

The horse, from the earliest accounts, seems to have been a native of most parts of Europe, Asia, and Africa. In some parts of South America numerous herds of them are to be found running wild, in a state of nature; which is said to have originated from a few being put on shore by the Spaniards upwards of two centuries ago. It is generally supposed, by most writers on this subject, that the original breed of horses in Britain consisted of two sorts, viz. the blood and black draught kind, although Mr. Culley, (in his Treatise on Live Stock) from the striking disproportion between the large draught horse, 18 hands high, and the small Highland pony, not more than 9 hands, is inclined to suppose that there are at least three distinct breeds, making the Shetland pony the third. This is a natural enough conclusion; yet when we reflect upon the effect and change which the different soils and climates make upon the animal and vegetable creation, the difference of size in the above-mentioned horses is not so much to be wondered at. But as to the origin and distinct breeds of this useful animal, I must here forbear entering into particulars, it being somewhat foreign to the present treatise. Suffice it to say, we have already such a variety of them, that by judicious crossing and good management we may soon be in possession of an animal fully competent for all the ordinary purposes for which they were originally designed. This point, I should suppose, is already accomplished in some counties, although very defective in others. That breed of horses, which of late has arrived at the greatest perfection, is the blood kind; from the best of causes, viz. that the greatest attention has been paid to them, not only in improving the blood by judicious crossing, but in making the most of that blood by a due and strict attention to proper management. It is here where the greatest error still remains to be rectified in most of the other kinds: for I have met with some good horses in almost all the different counties both in England and Scotland; and in such parts of those counties where a superior mode of management happened to be adopted, the difference of symmetry, strength, and action were so striking, that I have frequently been at great pains to trace the cause, and have almost invariably found it to be different from what any stranger might reasonably have conjectured; viz. that instead of being a distinct race of horses, they were the same, only placed under a better master. For example, send a farmer from Scotland, or even some of the counties in England (who has been accustomed to rear horses) into Yorkshire, and give him one of the best breeding farms there, with a stock of good mares and entire horses; allow him to follow the system to which he was formerly accustomed in rearing; and mark the figure which his stud would make in the field a few years hence: I am of opinion that they would not be acknowledged by the inhabitants to be Yorkshire horses. But, to bring the matter nearer home and more to the point, take a farmer from some parts of the Highlands of Scotland, and place him in Lanarkshire, under similar circumstances as above; would he produce for the cart or plough a stock equal to his neighbour's? or would they be taken for Clydesdale horses when sent to market? It is much to be feared that they would not, or at least would be clearly recognised as being of an inferior cast. Allowing, therefore, that such a change can be effected in two or three years by bad treatment, what would a continuance of such produce in half a century? The kind of horses which should claim the farmer's attention, are the draught and riding species; and it is to these only that I intend at present to turn my attention.

The former, in proving useful to the farmer, should possess strength, activity, hardiness, true draught, and a sound constitution; while the requisites for the latter are hardiness, good action, well performed,[*] done with ease both to the horse and rider; and strength sufficiently master of the weight intended to be carried. It may soon be ascertained whether or not a horse possesses all these good properties, except hardiness, for which time and experience are the best proof, and whose only substitute is the paying of proper attention to symmetry; viz. by seeing that the carcass is not too heavy for the legs, that the body is not too long for the height, that the head and neck are clear of lumber, and that too much day-light is not shown between the belly and the ground. As to the proper size of a horse, this must, in a great measure, depend upon the purpose for which he is designed. The middle size, from 14½ to 15½ hands, is preferable for riding or ordinary farm purposes; while I would give a decided preference to such as are from 16 to 17 hands (proportionably made) for waggons, or for ploughing heavy stiff clay soils, which two middle-sized horses are not able to perform with the ease requisite for durability. The proper shapes of a horse will nearly hold good throughout all the different kinds; such as a small head; fine muzzle, and wide nostrils; prominent cheerful eyes; small sharp-pointed ears, placed near together, having a quick movement[†] back and forward; the neck rising from the shoulder with a gentle curve, and neatly joined to the head; shoulders lying well back;[‡] short back, the tail being set on nearly in a straight line with it; long quarters shortly coupled to the ribs; broad straight loins; round body, with a deep chest, being neither too wide nor narrow; strong muscular thighs, tapering gradually until they meet, with clean, flat, sinewy, bony legs; short pastern joints; and circular hoofs, wide at the heel. The horses answering nearest to the above shapes are the Yorkshire hunters or carriage horses.

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[*] See section vi.

[†] Throwing the ears sharply back, with a slight gloom, frequently indicates hardiness.

[‡] The shoulders lying well back are more essential for a saddle horse than a draught one; for when the former has an upright shoulder he throws the saddle forward, by which means he carries his rider either upon the shoulder, or forward, past the line of it; in either of which situations, the horse will not be so able to recover from a stumble, but will most frequently be brought upon his knees.

It may not be foreign to my present design to take a summary view of the different kinds of horses in Britain which are most nearly connected with agricultural purposes, so that a person judging of their respective qualities may be the better able to select the kind most suitable for the particular situation in which he may be placed.

THE HEAVY BLACK HORSES.

This breed is supposed to be the original of the draught kind, and are now principally bred in the midland counties of England, particularly Leicestershire, Staffordshire, Warwickshire, and Derbyshire, where the teams mostly consist of mares, which are principally kept breeding, the male produce being sold to dealers who attend fairs in those counties for the purpose of taking them into the south and western districts, (to supply farmers and waggoners) where valuable teams of them are to be found. Most attention seems to be paid to this breed in Leicestershire and Derbyshire. They are generally from 15 to 16½ hands high, heavily made, and naturally slow, but well calculated for heavy draughts, such as ploughing stiff clay land, and drawing waggons. Their greatest imperfection, in point of shape, is, that their legs are generally round, with much superfluous hair and flesh upon them; which is the principal cause of their being so subject to the malanders[*] and grease. But there is a description of black horses, with broad shanks and a moderate proportion of hair, which have good action, and are much hardier than those already described. The difference of these two kinds of horses is more likely to have arisen from having been reared upon different soils, with a variation of climate, than from a cross. The black stallion was very fashionable in Dumfries-shire, Lanarkshire, and other parts of Scotland, about 20 years ago: so it may be supposed that a mixture of that heavy blood still remains in those quarters, and even in our famous Clydesdale tribe, so much noted for their trueness in draught.

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[*] Malanders is a kind of scurvy and grease to which the above descript of legs are subject; which may be prevented by cutting the hair close t skin, and keeping the leg clean by washing with soap and warm-w urine.

CLEVELAND BAYS.

These derive their name from their colour, and from being principally bred in the district of Cleveland in Yorkshire. They are likewise reared in several parts of Northumberland and Durham, and are supposed to be a cross between some blood horses imported and the original breed of Yorkshire. They are mostly of a good size, and are strong, hardy, active, and well proportioned, and are best calculated for work requiring much effort and dispatch; as a proof of which, Mr. Culley states that "three horses carry a ton and a half of coals, travel 60 miles in 24 hours, without any other rest than two or three baits upon the road, and frequently perform this four times a week." This is certainly an evident mark of durability, and is so much for a spark of blood and Yorkshire treatment: it likewise verifies the saying among the *knowing ones*, that "blood always tells at the long run."

SUFFOLK PUNCHES.

These horses are rather of a small size, being from 14 to 15 hands high, and are generally of a sorrel or chesnut colour, with white faces. In point of symmetry, they may justly be deemed far deficient. They have coarse heavy heads, ears, as it were, made for cropping, low shoulders, long deep bodies,* and short round legs. They are, however, noted for good walkers and trotters, and are quite proverbial for true draught and hardiness, which is a convincing proof that usefulness and speed are not always accompanied with true shapes. I have seen these animals

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[illegible] marks of durability which the Suffolk horses [illegible]red much of their merit, it being universally [illegible] dispensable for undergoing fatigue.

pulling upon their knees, for anxiety to take their draught along with them. Mr. Lawrence very justly remarks, in his Treatise on Horses, vol. i. page 296, that "their superiority over all other horses, at drawing dead pulls, is, no doubt, in some measure, owing to early training, as in no country is so much pride taken in teaching horses to draw; and it is well known, that a team of Suffolk horses, the signal being given, will all down upon their knees, and leave nothing behind them that is within the power of flesh and blood to draw away." These horses are indeed truly deceiving; for in the stable they have a most sluggish appearance, but in the cart or plough they assume a different aspect. For the ordinary purposes of farming, this breed is particularly well adapted.

CLYDESDALE BREED.

This species of horses is equally hardy as any yet mentioned; and perhaps a more useful animal of the kind is nowhere to be met with. Some of them are very plain in their shapes, while others are not so, but possess much the appearance of the heavy black breed in symmetry; and, as I have already mentioned, stallions of that breed were quite the rage some years ago in Lanarkshire: the present race of Clydesdale horses would therefore appear to be a cross between the heavy blacks and the common Scotch mares; which has proven a judicious one. They vary much in size, being from 14½ to 16½ hands high, and are of different colours, viz. gray, brown, and black, with a broad clean shank free from superfluous hair.

Dr. Coventry states them to be "an useful description of horses of a suitable size, (generally weighing about nine hundred pounds, and being rather under fifteen hands high,) plain, but not without mettle, strong, docile, and seldom ever known to be restive, and of a mixed origin."*

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* Mr. Culley states that "they are said to have been produced by a cross betwixt the mares of the common Scotch kind and six coach horses, (all stallions) brought from Flanders by a Duke of Hamilton, about one hundred years ago."

OLD ENGLISH DRAUGHT BREED.

This is still a favourite breed in Leicestershire and Northamptonshire. They are remarkable for beauty, symmetry, strength, and hardiness; and from the attention which has been bestowed on the breeding of these animals, they have now arrived at a great degree of perfection. It is therefore no flattery to style them "a model of a horse." They frequently bring high prices, and are found to be very useful in harness.

SCOTCH GALLOWAYS.

They are of various kinds and sizes, and their origin not easily traced, but are supposed to have been originally only natives of Galloway, and to have received a cross with the Spanish horses when a part of their invincible Armada was shipwrecked upon those shores. This breed of horses is falling much off from want of attention to suitable crossing. It is now as rare to meet with a good one as it was formerly to meet with a bad one; for they were, at one period, universally noted for activity and hardiness, from their performing long journeys in a day with very inferior treatment and bad horsemen. They prevail mostly in Caithness, Shetland, Orkney, and the Western Isles, and are supposed to have been much mixed with foreign blood when the Danes had frequent communication with those parts. The Islay ponies were in great request a few years ago, and indeed very justly; for they were of a superior cast, and showed much blood, not only in their appearance, but in action and durability. For the weight they were masters of, better hackneys* were not to be met with. The Scotch ponies, in some parts of the kingdom, may justly be deemed a useless race for agricultural purposes; but, in some parts of the Highlands, when taking a view of the elevated patches of land necessary to be cultivated for the sustenance of the inhabitants, connected with the keep attainable for those animals, I should like to know the kind of horse that would better supply their place.

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* The superiority of the Islay ponies, a few years ago, might be ascribed to the late Mr. Campbell of Shawfield's attention in introducing proper stallions into that island; which of late has not been attended to: consequently the breed is much fallen off, and a good pony is rarely to be met with. But from the taste and spirit of the present principal proprietor of the island inclining towards that animal, it may be expected that in a very few years the celebrity of the Islay pony will be re-established.

WELSH PONIES.

This race of horses resembles so much the Scotch galloways, that nothing further remains necessary to be said about them. They are small, hardy, in general quick and durable travellers,* and of various colours. How and when those small breeds were introduced into the Highlands of Scotland and Wales, I know not; but it appears to me to have been through a wise dispensation of Providence, as they are peculiarly adapted for their respective situations; and to abandon them with a view of introducing a more suitable species, would, in all probability, prove a fruitless attempt. There is, however, ample scope for improvement by judicious crossing.†

Although I have now given a short description of several kinds of horses, yet it must be remembered that there are various species of those kinds, which would be an endless task to attempt here to describe. Indeed, I conceive it beyond the power of research, having frequently bought horses in both England and Scotland, without being able to trace the proper root from whence they sprung. These mixed breeds are, however, most prevalent on the borders of counties and places of easy access to different kinds. For instance, in the lower parts of Annandale, bordering upon England, you will find a mixture of English, Scotch, Welsh, and Irish. From repeated crossings, it is natural to conclude that some of the present breed are a composition of the whole; and if the pedigrees of such could be made out, they would far exceed in length the long-winded puffs generally given of blood stallions. But this being a matter of no consequence, I shall not enlarge upon it, but proceed to explain one of the most essential points (Management) under the following heads; viz. Breeding, Rearing, and Treatment during service; and conclude the chapter by explaining the symptoms and causes of the most prevalent diseases, with preventives and cures annexed.

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* I once rode a pony of the above breed, about thirteen hands high, for about ten years: he lived till near thirty years of age, and when about twenty years old, he thought nothing of performing a journey of fifty miles in one day, with twelve stone upon his back; which seemed only to operate upon his constitution as gentle exercise.

† A thorough bred horse with much bone, or a Yorkshire hunter with much blood, might answer best for improving the pony race.

SECTION II.

BREEDING.

This being the first step essential in the management of horses, it ought first to claim the farmer's attention. Although it is by no means commendable to extend this process to any length in some situations, yet there are comparatively few, where one or more horses may not be annually reared to advantage. Taking it for granted then, that the breeder has fully in view the kind of produce he wishes, and consequently chosen his males and females accordingly,* he must next calculate (should the mare be intended to work during her pregnancy) at what period he can best spare her a little from work, as this is necessary a few days before, and at least ten days after foaling; which period† should be as soon after the commencement of grass as possible; for early foals stand the winter best, and generally make superior horses, from their not being so liable to receive a check the first winter. But should the mare not be intended for work, or can be spared by putting another in her place when she is about to foal, let the commencement of grass be the standing rule for having the foal dropped, that being the best and most natural food for the supply of milk. The mare should be in good condition when put to the horse, without being too fat, otherwise a risk will be run of being disappointed of a foal. During the time of gestation she may have gentle work, such as light ploughing; but never on any account to be allowed to feel stress or fatigue: blows and frights must also be strenuously avoided. If the mare is an idle one, she ought not to be pastured with colts, for they would be apt to tease her so much as to cause the loss of both the expected offspring and mother. When the mare is allowed to run constantly out, she ought to be provided with a shed to run into during winter or stormy weather, as being exposed to much cold and wet is liable to bring on a weakness in the loins, which is frequently the cause of abortion.* A little dry food is also necessary in winter: in short, the breeding mare should always be kept in good condition, but not fat, particularly near the time of foaling; at which period she should be carefully watched late and early, to prevent the foal from being smothered in the bed, or any other unforeseen accident which might occur. In order, therefore, to guard against loss and reflection, let some person always attend the mare, if possible, while in the act of foaling. By adhering strictly to what has been already stated on this subject, I should gladly hope that the breeder will be fully recompensed for his attention, by having, at the end of eleven months, (nine times in ten) a healthy nursing mother with a promising offspring. The foal, strictly speaking, may now be said to be bred: the next thing, therefore, in succession, is the proper treatment during the time of rearing.

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* If an improvement is to be attempted by crossing, see remarks in the chapter on that subject.

† The above period's arrival may be known by the end of the eleventh month after the mare has taken the horse, or rather the end of the eleventh month after the last time she received the horse.

SECTION III.

REARING.

During this period, every thing depends on making a horse have a good constitution, and master of the work for which he is designed. This is the time to make the animal pay for the trouble and expense which may be incurred before he be able to work or taken to market. This is the time to avoid blemishes and farriers' bills: in short, this is the time either to make a horse, or only the shadow of one.

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* Dr. Coventry very justly remarks, that "perhaps to this accident the very fat females are liable in the beginning and towards the termination, and the very thin ones about the middle period of pregnancy."

The mare, immediately after foaling, should receive a lukewarm draught of meal and water, and a mash of bran occasionally for a day or two. She must be well fed during the whole period of nursing; nothing being better than a good pasture full of white clover, with a plentiful supply of water. Should the situation be exposed, a shed should be erected (as I have already recommended) and the mare accustomed to go into it; which she will soon do in cold nights, for the safety of her foal. It may be prudent in some cases (particularly when the mare foals early in the spring, and the climate is subject to frost in that season) to put the mare and foal into some stable, loose, every night for ten days, until the foal has gained some strength, and the mare thoroughly recovered. It sometimes happens that young mares are ticklish in letting their foals suck at first, and likewise that some foals, although apparently sucking, do not draw milk. The former may be remedied by holding the mare* for two or three times until the foal suck; and the latter by putting the teat into the foal's mouth, and drawing the milk with the finger and thumb. At the expiration of ten or fourteen days, the mare may be put to light gentle work, if necessary, always avoiding heavy pulls and long hours, as the latter will prevent the foal from getting a sufficiency of milk at regular intervals, while the former will furnish it with milk warmed above the natural temperature, which is equally injurious.† The foal ought to be weaned when about six months old, and kept running loose in a house with a low rack and manger, giving it cut grass or fine hay, with some bran mashes and a sufficient supply of pure water. As soon as the foal has forgot its dam, it should be let out during the day into one of the sweetest pastures; but if the day is wet or stormy, it may remain in the house. It would be of great advantage to give the foal a little mashed oats every morning before going to grass, which would not only assist its growth, but prevent any bad effect from frosty water, grass, or any other unsuitable feeding to which it might have access throughout the day; and always, upon the slightest appearance of costiveness, it should be supplied with some boiled barley or bran mash, mixed with a little sulphur or magnesia; nothing being more essential to growth than keeping the bowels open. But when situation and climate will permit, it would be better to let a foal run out night and day for some time after it is weaned, not forgetting to house it before too great a falling off of the weather or grass, and not adhering to that too prevalent custom (particularly in Scotland) of letting the failure of the foal dictate the time for housing. This is a bad criterion to go by, for it very frequently happens that such a falling off, however trifling it may appear at the time, is very difficult to get the better of. I have seen such treatment of foals operate much against the breeder in his farming operations, and likewise severely against his purse in a market: for it not unfrequently happens that he meets his neighbour at the same market with an animal of a similar age and breed, but from quite an inferior sire and dam, which, although it has received no better treatment from the time of housing, brings from five to ten pounds more in price. It is *then* that he is galled, and begins to reflect upon the cause, which, if traced back, would be found to be neither more nor less than that his neighbour, instead of making the falling off of the foal his standard for housing, made the falling off of the weather and grass his guide. This rule will hold good, although perhaps in a smaller degree, in all the years that may be said to come within the period of rearing; and is equally applicable to all other animals. Indeed the slightest check of growth should be strenuously guarded against in the rearing of all young animals, whether from hunger, cold, or severe exercise. During the first winter the foal ought to have the finest particles of the provender selected for it. A little mashed oats ought likewise to be given, at least once a day; also some succulent food, such as a few sliced carrots, &c. In short, the foal should have a good breakfast, dinner, and supper, with a dry bed, otherwise strength and symmetry will be out of the question. The first winter being over, and as the falling off of the fine weather and grass was the criterion for housing the foal, let the return of them be the guide for turning it out. If the animal has a right from birth to turn out very valuable, it ought to have a feed of mashed oats* morning and evening while at grass, as each feed then will pay doubly what it will do at a more advanced period of life. By thus feeding, and handling in the fields, it will retain that docility which ought to have been acquired by such treatment during winter. This will render the breaking an easy task for both man and horse. The second winter approaches, when the colt will have gained such strength and digestive powers as to enable him to endure, with less injury, the inclemency of the weather, and live upon coarser food, if necessary. The further treatment therefore depends, in a great measure, upon the nature of the breed. If the animal is intended for the saddle, with a dash of blood in him, housing and treating as already described will be necessary. But if he is of a coarse stamp, and intended for draught, he must be brought up a little more hardly, so as to be better able to endure the bad treatment, and sudden transitions from heat to cold, to which the working tribe are so liable from the negligence of their grooms. Animals of the latter description may therefore be allowed to lie out night and day, but not without a shed† to run into during the night or wet weather, and a plentiful supply of hay or straw every morning and evening. Such treatment as has been already described, may be continued during summer and winter, until the time of laying to work or sending to market, which must be regulated according to circumstances. If for sale, the age that suits the market must be the consideration; but if for work, the time most suitable for that purpose will depend upon the kind of animal, and the purpose for which it is intended. Allowing that a small breed of animals is sooner at perfection than a large one, (which I am satisfied is the case,) a saddle horse, if of a small breed, may be rode gently, short journeys, with a light weight, when four years of age, put to a moderate day's work at five, and at six he will be master of all the fatigue with which he ought ever to be tried. But if the horse is of a large breed, commence at five years of age, and so on as above. A work-horse of a small breed may harrow light work half a day* at two years of age, a short day at three, plough light work at four, cart and plough gently at five, and be put to regular work at six years of age. But instead of putting the females of either description so early to work, I would give them the horse when three years old: they will then rear a foal and be ready for work at five, which is the most proper age. This plan I have tried with great success even with the saddle horse. The breaking of the saddle horse ought to be done by degrees; for instead of letting him run wild until four or five years old, and then using every means of violence to render him docile, as is too frequently the case, he should have a little gentle exercise with the breaking tackle every winter from one year old until thoroughly broke. In order to accomplish this properly, a horse should never be mounted too soon, however quiet; but led about at a lively walk, preventing as much as possible breaking to a trot, as he will otherwise acquire that insignificant pace between the two with which the action of so many valuable horses is spoiled. In short, when teaching a horse any particular pace, it should be done with life, but he should never be put to the extremity of that pace until the art is fully acquired; and even then, the less the better. I shall just mention another necessary step in making a well-broke horse; which is, frequently setting him upon the bit, that is to say, letting the horse stand turned in the stall, with his tail toward the manger, with a rein from each side of the head fastened to the posts of the stall. This serves (in the words of a celebrated author) to correct the errors of the mouth, elevate the head, and set the horse upon his haunches. Horses intended for harness ought likewise to have a little of the above discipline bestowed upon them, and taught to draw by being first coupled with an old steady horse. The horse may now be said to be reared, being laid to work; which leads to a discussion of the third essential point in the management of horses, viz. the treatment during the time of working.

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* Should the mare be inclined to kick, a 'twitch' must be put upon her nose.

† Milk of the above description is apt to gripe the foal, and render it costive.

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* Mashed or broken oats are preferable to whole ones in feeding any horse, as the latter are frequently swallowed unmasticated, and thereby elude the digestive powers and are ejected unbroken. This is, however, more frequently the case with horses running constantly out, (their bellies being full of slippery grass) and old and greedy horses fed with potato oats.

† Many young horses, from the want of such shelter, and the wet lodging in the hair, have got a weakness in the back or loins, from which they have never recovered.

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* When there are two or more of the same age, one may be wrought in the forenoon, and another in the afternoon, four making a regular pair.

SECTION IV.

TREATMENT AFTER BEING LAID TO WORK.

Many a good animal has been spoiled by improper management while at hard labour, and much valuable food has been wasted by an injudicious application of it. Any one who has had experience in working horses, must be well aware that the best day's work is neither to be had from the lean horse nor the too fat, but from a due proportion of flesh firmly laid on. This state must therefore be the principal object, with respect either to a hackney* or draught horse. But as the management of these two ought to vary a little, I shall speak of them separately. The management of the riding horse or hackney must be regulated in some degree by the custom of the country in which you are resident; for should your neighbours, or the innkeepers in the market towns, (both of whom you may have occasionally to visit either through friendship or business,) keep bad stables with bad discipline, where perhaps you cannot even get a stall to feed your horse, or if so, probably not sufficient to shelter him from the inclemency of the weather; far less will you be able in such situations to get a sheet to throw over him, which is so requisite, particularly over the loins, when put warm into a stable. Being thus so unfortunately situate, you must not sheet the horse at home, nor keep the stable too warm. Let it be even cooler than what is generally requisite for the nature of the horse. In this case, he will not suffer so much injury when he goes from home to visit his ignorant or indolent neighbours. As to feeding, the more justice the horse receives in that respect, he will be better able to endure such hardships;

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* Hackney, although signifying a hired horse, is a term frequently used for a riding horse.

which he will sometimes have unavoidably to undergo. But from the growing improvement in the management of this animal, (and allowing that there are still such situations* to be found as I have just been describing,) it is to be hoped that the period is not far distant when such obstacles will be entirely removed. I shall therefore proceed to explain the treatment to which a good hackney is entitled. First, the stable should be warm, with windows to admit a free circulation of air, when necessary, and the stall sufficiently wide to allow the horse to turn round in it with ease. If it is wished to ride a horse possessing spirit and a clean skin, he must be well fed and clothed when in the stable, with as much *elbow-grease* bestowed upon him as can be possibly screwed out of the groom; and if he do his duty, the horse which is rode to-day will have no marks to that effect upon him to-morrow morning. To accomplish this, the work must be executed in the following manner. If the horse is warm, let the groom first wisp his body well with two hard straw wisps, until nearly dry; then throw a cloth over him, and wisp his head and legs well; or, should the latter be very dirty, it may answer better to wash them and the feet with lukewarm water, rubbing them afterwards until quite dry: next commence with the currycomb and brush, beginning always at the head and right side of the horse, having the comb in the right hand, and brush in the left, but the reverse when cleaning the other side. The comb should not be applied (at least very slightly) to the head, or below the knee, or hocks, but merely kept in hand to clean the brush upon; and it will be necessary to knock the comb upon the ground occasionally, to clean it. After justice has been done with these two articles, he may finish with a hair-cloth, beginning at the head, and going over every part of the horse, when the sheet may be put upon him, (being perfectly dry,) and the hoofs stuffed with clay or cow dung, if tender. Such a dressing, if not too sparingly executed, will make both the groom and horse rest comfortably. Should the horse not be receiving work regularly, he ought always to be walked a mile or two every morning and evening, after receiving water; no other pace being found necessary, but injurious. Experience* has fully established that walking exercise is sufficient to qualify any horse for the duties he is intended to perform, except the blood horse and hunter; the former requiring regular gallops some time before running, and the latter gentle canters, with now and then a brush of speed. But I am convinced, from the little I know of these animals, that if they got more walking, and less galloping, they would be better enabled to perform their work, and with more success. As to the proper and most economical food to be given to horses, much has been said and tried on this head; and frequent attempts have been made, as it were, to get hard work out of slight soft feeding. I have likewise tried this to a certain extent, by feeding with Swedish turnips, potatoes, carrots, and straw, &c. with one feed of oats (and sometimes none) per day: which I found would make fat, give a clear skin, if the horse was idle, or gently wrought; but when hard wrought, I soon discovered the necessity of having recourse to more substantial food, and invariably found that hard work required hard feeding. But it would occupy too much of this chapter to insert all the different modes of feeding horses which have been tried, and are still practised. I shall, therefore, only simply state my own opinion. The feeding of horses, no doubt, may be regulated according to the nature of their work; but the common custom of beginning to feed better, when hard work commences, is most absurd; for the durability of a horse does not certainly depend upon the quantity or quality of the food given only at the time he is working,* but upon the firm condition he is in at that time, although it has been obtained by inferior food when idle, or moderately wrought: which condition ought to be kept up when the horse is put to harder work, by giving more nourishing food more frequently. The bad effects of starving a horse in winter, and putting him suddenly upon good keep in spring, must certainly have been observed by most of my readers. The horse so treated destroys as much, or more valuable food than one in good condition, without being able to do above half the work, and not even that to the purpose: for horses in a poor state in spring may do to skim the surface of half an acre of land in a day, but cannot be expected to plough one acre a proper depth like those in good condition. This kind of stable economy, I am persuaded, if examined into, would turn out to be a saving with the one hand, and losing doubly with the other. For example, let a field of 60 acres, under the same state of management, and all equal in every other respect, (and allowing this field to be of such a nature as to require a deep furrow to insure a good crop,) be ploughed, the one half of it with two winter-starved horses, and the other half by two well-fed ones. The former will require 60 days to plough their share, (and most likely in such a manner as scarcely to cover the seed,) while the latter will finish theirs in a husbandry-like manner in 30 days. The difference (when allowing five shillings per day for a man and a pair of horses) in favour of those in good condition, will be £7, 10s. which, when added to the difference of crop estimated at 30s. per acre, (between skimming the surface and ploughing a proper depth,) will amount to £52, 10s. beside the further difference of having two horses able for all the ordinary purposes of farming throughout the year, and easily kept in summer; and two not fit for any work, but so much exhausted by the labours of the spring, as to require to run at grass all summer, to enable them to keep in the life with their usual treatment next winter. Should the above experiment, upon a fair trial, not turn out as I have stated, or even as much against the poor horses as would put and keep them in the same condition with the well-fed ones, let the farmer then continue to starve his horses; but, on the contrary, I hope he will not hesitate to feed them liberally. There is likewise another disadvantage (among many others that might be quoted) which attends the above irregular system of feeding; viz. that a poor horse frequently, when turned suddenly upon good keep and plenty of it, overcharges the stomach, and thereby loses his appetite, and consequently is soon not able to work. In short, experience has fully proven the bad consequences of suddenly attempting to fatten or improve any starved animal, by giving him a full command of rich food; as likewise the sudden attempt of reducing any fat one to be equally bad: therefore to make fat or reduce must be done by degrees. But I shall return to good keeping; which in all cases will be found to be the best economy. The keep of a horse will necessarily vary according to the season.* I shall first proceed to give directions for feeding the hackney, upon the best and most economical plan, during summer. Grass being the natural food of horses, they may be kept in good condition upon it alone; and should any gentleman choose to keep a horse, not having much work for him in summer, the cheapest and best treatment which he can give is to turn him out† upon a good sound pasture:‡ but if the horse is occasionally re-

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* The Highlands of Scotland might justly have been noted for such inconveniences, and may in some instances still be so; but it is pleasant to see the rapid improvement which of late years has taken place in that country, and I think the only defect which now remains to be rectified, is, bad stables and bad discipline at the inns in the market towns and villages. As to the gentlemen's stabling, you may ride a descendant of an Eclipse or a Highflyer that would meet with treatment similar to that which their forefathers did in some of the *knowing ones'* stables in England. The respectable tenants in the Highlands can now afford tolerable accommodation for horses.

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* It is likewise found, from experience, that a half-blood or hackney will not stand training like the thorough bred horse: on the contrary, he will get slower the oftener you put him to his speed, and will (according to an old saying) soon get "as slow as a top."

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* Although there is some truth in the old saying, that "a full belly makes a stiff back," yet it would certainly be attended with great loss of time and inconvenience, to add strength to a horse's back in this manner, by always ceasing from work when he is hungry, until he fill himself.

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* Dr. Coventry states in his Discourses, &c. that "a dry kind of food would appear to agree better with all animals in winter, when the perspiration is less, than in summer, during which season moister provision would seem to be more suitable for them."

† If a horse is to have a whole summer's run, without ever being wrought, it will be proper to take off his shoes, and pare the hoof until the frog come fairly in contact with the ground; and if the ground is hard, in a very dry season, it will be necessary frequently to pare the toe of the hoof, and keep grass shoes upon him; that is, narrow pieces of iron, just wide and long enough to cover the crust, and prevent its being broken. See Lawrence on Horses, vol. ii. p. 110.

‡ When the situation will not admit of a horse's being turned out to grass, or where the raising of manure is an object of great consideration, recourse may be had to soiling in the house with tares, lucerne, or any other artificial or natural grass, giving them always in a fresh state; for, if long cut, the juices will exhale, and they will become tough and indigestible, and apt to occasion dangerous obstructions.

quired to go a long journey, it will be necessary to give him a feed of mashed oats every morning, and perhaps in the evening, should the work entitle him to it. A horse at grass requires little attention, being generally in a good habit of body, and free from disease. The currycomb and sheet should then be as seldom used as possible: the former may, in some cases after riding, be necessary to loosen some stiff clay, &c.; but rubbing with straw and a haircloth is generally all that is requisite: the latter must be used when a horse comes warm into a stable, by being thrown over his loins, and allowed to remain until quite cool; as a horse when warm ought never to be turned out to grass. Summer being near a close, or when the weather begins to be cold, and the grass to lose its nourishment, the animal must be put into the stable. This, however, must not be regulated by the falling off of the horse, otherwise you lose, in a great measure, the good effects of a summer's run at grass. This is the most critical time for the management of a horse; this is the time when that treatment is requisite, which, if neglected, will prevent the master from having a pleasant ride, and tease the groom all winter: in short, this is the time when the winter labours of a horse may either be made light and easy, and operate as gentle exercise, or as a dull, heavy, irksome, and dreary task. To avoid the latter situation, and insure the former, let the horse, immediately on being taken from grass, get a gentle dose of physic,* and not be too soon put upon hard keep, but let the change from soft to hard food be made gradually, by giving mashes of bran and boiled barley twice a day along with good natural or ryegrass hay, (clear of clover,) and one feed of mashed oats. Let this be continued for the first ten days; then give another gentle dose of physic; continue the same food for a week; after which, give a feed of broken oats in the morning after water, and another at noon; and every other night give a feed of boiled barley, with as much pounded nitre in it as will lie upon a shilling. Carrots, or Swedish turnips, &c. well washed, may be given the nights that the barley is not used. Should the horse's work be easy, he may do with half a feed of oats* at one time, water twice a day, and gentle exercise. If he become very plethoric, or be naturally inclined to grease or stock in the legs, take a little blood from him; and a gentle dose of physic, with a few staling-balls, may occasionally be given. As a horse, however, may receive all the attention which I have recommended, and not be able to stand a long journey without being regularly fed, rested, cleaned, and wrought, I shall, therefore, conclude the treatment of the saddle-horse, with the attention which ought to be bestowed upon him during a journey, in order that he may perform his work with ease to himself, and satisfaction to the rider. If the horse is in low condition, give him a feed of oats before setting off in the morning; but if the contrary, none, or at least half a feed, may be sufficient. Give no water; ride slowly at least three or four miles; go from twelve to fifteen miles to breakfast; and, if your horse is not warm, give him a moderate quantity of water within a few miles of the end of the stage, if convenient; but if not, give him a small pailful after being a short while in the stable and eating a little hay, seeing that he is first quite cool. Then let him be well rubbed down, and a sheet thrown over him, and receive a feed of oats and beans: next, get the saddle properly cleaned and dried on the part that touches the horse's back. Should there be any hard pieces in the stuffing, it should be beat soft with a stick; and after having baited for about an hour and a half, pay the hostler according to his labour, and proceed on your journey. At the end of ten or twelve miles, give a few quarts of meal and water: if no meal is to be had, a feed of oats will answer, with a little water, and no hay; and, after making out about twenty miles, stop and treat as you did at breakfast, stopping half an hour longer, if time will permit; then go about fifteen miles more to complete your day's work. After your horse has been well dressed, and is quite cool, give water; and after feeding one or two hours upon good hay, (clear of clover,) feed with mashed oats and beans. Should the horse's feet be tender or hot, stuff them with clay or cow-dung; and having a good bed, he will then rest comfortably from his labours. You will thus have travelled about fifty miles in twelve hours, appropriating about four for feeding and eight for riding, and consequently have travelled 6¼ miles in an hour; which ought never to be exceeded in going a long journey. Some will think fifty miles per day too much, while others may count it nothing; but I should think a horse not worthy of the treatment I have here pointed out for him, unless he can perform such a journey six days successively,* with ease to himself and rider, or at least as often as such a journey may become necessary for a farmer or traveller to perform: and when a horse does perform such a task, I think he has discharged his duty, and more should not be required of him. But to perform such a journey for any length of time, requires the best of keeping, and a considerable dash of blood; as I am convinced, that a horse of this description will endure more fatigue, and recover sooner from it, than one that has no blood at all. Having now given a description of the requisite treatment for a saddle-horse, both in the stable and out of it, and from the near alliance which the feeding and treatment of the draught-horse has to that of the saddle one, little remains to be said on that head. But as the nature of the draught-horse does not require so much pampering, it may therefore be proper to point out the difference which ought to be made between the two breeds. As to dressing, they ought to share equally; only the hair-cloth and sheet may, in the case of the draught-horse, be dispensed with, and, in place of turning him out to grass in summer, he ought to be fed in the house with cut grass and tares, &c. and turned out in the evening for about six weeks, when the weather is fine, and the grass at the best, as it would appear to be requisite that every horse should have at least this run. In winter, good straw[*] may do instead of hay; but, at all events, the coarsest hay and other food should be given in this season; for, although horses are not idle, yet they will not be so busy as in spring, and consequently will have more time to choose the best of inferior provender; which they will in general take time to do. But when the period of hard work comes on, there is seldom time allowed for that purpose. Food of a superior quality ought therefore to be reserved for the spring, in order that the horse may make the most of the short time which is generally then allowed him, and that one hour's constant eating may afford him more nourishment than three of pick and choice. These are the only differences which I think ought to be made between the management of the above-mentioned horses; but as I have given a description of the proper timing of the saddle-horse's work during a journey, it may be justly considered to be not less necessary to do so respecting the draught-horse during his day's labour. The hours of working the draught-horse seem to be very minutely attended to in some countries, while in others no attention whatever is paid to them. Both of these methods I have seen carried to great extremes.[†] The regularity as to the time of feeding and

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* For physic, the method of giving it, and treatment requisite, see section v. art. Physic.

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* Feeding with new oats must be carefully avoided, and should never be given without being previously kiln-dried.

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* I once rode a half blood mare, in the month of November, from London to Carlisle, in six successive days, (being 300 miles,) giving her just the treatment I have now described; which journey she performed without the least inconvenience to either me or herself. I likewise once rode a small pony of the same description eighty miles in one day. This was an urgent case, otherwise I would not have attempted it, being too fond of horse flesh to abuse it.

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[*] Straw ought never to be old thrashed, otherwise horses have not such a relish for it.

[†] I have frequently seen, where the hours of working were from six o'clock in the morning until six in the evening, with an hour to bait at breakfast, and an hour and a half at dinner, (sufficiently long if well applied,) in the ploughing of a field, two or more ploughmen loose their horses, immediately on hearing or seeing that it was six o'clock, when perhaps one half hour would have completed the field: they would go home, leave all their ploughs in the field, and return next morning to finish it, and thereby spend most of the morning or forenoon before they got commenced in another field, from its lying in an opposite direction of the farm. While these *time-pieces* thought it prudent not to forget six o'clock, or that it was doing themselves and horses great injustice to work half an hour after it, they ought at least to have studied the justice due to their master, along with that which they conceived was due to themselves and horses, by only leaving one plough in the field to finish it. I have likewise seen, in some parts of the Lothians, a ploughman loose his plough immediately on the stroke of six, when ten minutes would have finished the field. I have often thought, that such regular machines would see and hear better at night than in the morning. On the other hand, I have repeatedly witnessed men going out to plough at the various hours of six, seven, eight, and even nine o'clock in the morning, and finishing at all these different hours in the evening. The master of these men I would call a manager by "fits and starts."

working of both men and horses has been, from long experience, found to answer best for all concerned. The farmer will therefore find it his interest to fix hours for that purpose, and adhere strictly to them, only allowing such hours to be infringed in cases of necessity, or particular urgency. The following regulations will, in most situations, be found to answer master, servant, and horse. In winter, let some of the servants be carrying on the thrashing * from six o'clock until half-past seven, while others are preparing the horses for the plough, or other work, by cleaning, feeding, and putting on the harness, go to work at eight o'clock, remain till twelve, feed till one, then go to work, and remain until five o'clock. This will answer in the beginning or end of winter; but in the shortest days, begin at nine o'clock, work till twelve, bait till one, and work till four o'clock. In spring and summer go out to work at six o'clock, remain till nine, feed till ten, and work till one; go to work again at half-past two, and work till seven o'clock. In spring, if the horses are in good condition, these hours may, in cases of urgency, be extended an hour, but by no means continued; and in summer, when the food given is generally more succulent, but particularly when the horses are turned out to grass, the time for baiting must be lengthened, and the hours of working shortened by at least two hours; for in this case the horse requires more time to fill himself, and, from the nature of the food, is not able to work such long hours. Great caution should be used in not giving horses too much water, particularly when they are warm; which is a most ignorant custom, not likely soon to be overcome by servants.† If the horse

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* If the thrashing is done by a machine of draught, I would recommend bullocks to be kept for that purpose, which make a much steadier draught in a machine than horses, and would save them for making a better day's work either in cart or plough.

† It is a common saying among servants, and too frequently acted upon, "Let them have their bellyful, it will make them eat their corn better:" which has often a contrary effect by cholicing them, and preventing their eating altogether. When this is the case, I would let the man who gave the horse such a bellyful of water so unseasonably, have his bellyful of hard rubbing at the horse; and when he gets into a state of perspiration offer him a bellyful of cold water, which he will most readily refuse, saying that he is too warm. This practice would therefore appear to arise more from carelessness than ignorance.

is warm when coming from work, he should only be allowed as much water as will wash his mouth; and, when cool, receive a moderate allowance. There is another injurious and frequent occurrence, to which these useful animals are subjected by their keepers; that is, not cleaning or bedding them properly after a hard day's work: for the prevailing custom is, to stuff their racks with hay or straw, to wisp them over for form's sake, and shake a little straw over a heap of dung, which perhaps has been there for weeks. This is not even done with the idea or intention of contributing to the comfort of the animals, but merely to prevent them from being so dirty next morning, as to require an extra-cleaning so as to make them passable, or distinguishable from the pig wallowing in the mire. So laborious a grooming being executed, the servants then content themselves by saying, one to another, "I think they may do very well now until the morning." Next day the horses leave the bed upon which they perhaps durst not lie down, and go pleasantly to work with their coats matted together, from the perspiration caused by the fatigues of the former day's work. Can a horse in this situation be expected to perform his work so well, with so much ease, or be so durable and free from disease, as the one which is well cleaned, and has a comfortable bed at night to rest his wearied limbs upon? Certainly not; for the one will make a better supper, and with more relish, than the other, being so much refreshed by cleaning, and consequently better able to endure the fatigue of the approaching day. But I do not intend here to insinuate, that work-horses are to be treated with such ceremony, in going through all the different manœuvres of cleaning that a more delicate animal requires. This is not necessary; neither can it be expected from their grooms:* but I trust that any sensible groom of a work-horse will join me in thinking, that it is absolutely necessary for the health of his horse that he lie on a clean comfortable bed, after as much grooming as shall have cleared him of all marks of perspiration and filth, accumulated during the day; and in short, that the collection of *such* in one day should never, on any account, be allowed to meet with that of another.

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* It is not reasonable to expect that a man, after toiling hard a long day, can be so able to give his horse such a cleaning as the groom, who has been loitering about the stable all day cleaning bridles, saddles, &c. and, as it were, killing time, and waiting the return of his master. Fortunate it is, however, that such is not necessary; for as the work of the grooms differs, so do the constitutions of the horses.

During the time that the horses are out at work, a person should be appointed to air the stable well, by opening windows, &c. and keeping the stable clear of all other animals, such as pigs, poultry, &c. clearing all the racks, and putting in a sufficient quantity of hay or straw,* cleaning all the mangers well, and putting before each horse a feed, consisting of mashed oats and one third of beans. This will be a great saving of time, and will allow the horses to commence eating the moment that they arrive in the stable; whereas, if every man were allowed to feed his own horses, one half of the baiting time would be spent in giving the food, or otherwise it would be given in so hurried a manner, that no regard would be paid to regularity or cleanliness by a hungry fellow, more anxious about his own dinner than that of his horses.

Having now treated as minutely and fully on the management of the horse, with respect to diet and usage, as the limits of this treatise will allow, it now only remains to describe the causes, symptoms, preventives, and cures, of the most prevalent disorders that attend those horses to which I have here more particularly confined my attention, viz. the saddle and draught horse.†

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* If at noon, as much as will serve until they go out to work must be given; and when they return from work in the evening, as much as will suffice till eight o'clock, when the horses should be last fed with as much as will serve them until the first entering of the stable in the morning. This will keep the fodder always fresh, and prevent its being contaminated by the horses' breath; which is found so injurious to the feeding of all animals.

† As I have taken notice of no diseases but those in which I have had some experience, my reader must therefore excuse any supposed omissions; and, for his better information on the subject, I beg leave to refer him to some of the most modern professional writers; viz. White, Clater, Lawrence, Taplin, &c.

SECTION V.

ON THE DISEASES OF HORSES.

From the harsh treatment and different hardships to which horses are exposed, the diseases which attend them are, of course, more numerous than those of any other domesticated animal; as it may be observed that the disorders are few when in a state of nature, compared with those when under the control and management of man: consequently, the greater part of them would appear to arise more from bad treatment, than either a constitutional or hereditary cause. Hence, the best preventive against most of the diseases that attend these animals, is a strict attention to proper management,* and always treating them with that respect to which their usefulness entitles them. This being strictly adhered to, would at least reduce the list of numerous diseases. But before separately treating of such diseases as will unavoidably occur, it may not be improper, first, to describe the method of performing the various operations necessary in attempting different cures and preventives for them, and for removing natural or artificial blemishes, as well as explaining the nature and effects of the prevailing medicines recommended.

BLEEDING.

This operation is now so generally understood, that it may be deemed superfluous for me to say any thing on the subject; but from the frequent misapplication of it, and the rough and injurious manner in which it is still daily performed in some countries, I cannot here pass over it altogether. The old system still prevails, and is too frequently executed in the following manner; viz. by stringing the neck, to raise the blood in the vein, so that the operator may see where to place his fleam, and commence striking with the blood-stick, which is not unfrequently done four or five times without effect; but to make amends (as he thinks) for all bypast mistakes, and with the determination of bringing blood next attempt, he adds double strength to his blow, when he brings blood, not by opening a vein, (which is all that ought to be done,) but by dividing one, or perhaps wounding an artery or a tendon. Such bungling treatment is the cause of so many swollen necks after bleeding, and sometimes ends in making the cure worse than the disease. The spring fleam is, I understand, rather losing ground, but not without a good substitute, viz. the common lancet, which is by far the best method when done by an experienced operator, and may be executed in the following manner. First, let the horse be trotted, or moved about a little, so as to cause a free circulation of blood. Then, if it be intended to bleed on the right side of the neck,* as a substitute for stringing, press the thumb of the left hand hard upon the main vein, where the neck joins the shoulder-blade, or at the place where the cord is generally fixed. The vein will then start, so that it may be quite visible where to make the incision, which ought to be about an inch below the joining of the vein that runs from the lower jaw: but should this not be perceptible, as is sometimes the case in a rough coat or thick skin, about four inches from the head take a sufficient length of the lancet before the finger and thumb of the right hand;† then proceed by pushing it forward in a slanting direction, pointing towards the head. The left thumb must still be pressing, to cause the blood to flow more copiously. After taking the necessary quantity of blood, ‡ pin the orifice, not by separating the skin far from the vein, otherwise the blood may get in between the skin and flesh, and cause a swelling. A little hair must be taken from the mane or tail of the horse, and tied round the pin, after it has closed the orifice. The horse must then be tied with his head up to the rack for about an hour.

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* The proper management of a horse I have already endeavoured to explain; but it may shortly and simply be comprised in wholesome food, duly proportioned, well timed, and seasonably given; gentle exercise and correction, with a moderate proportion of work, likewise well timed and seasonably given; great caution against badly aired stables, extremes of heat or cold, and the sudden transition from the one to the other.

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* The place for bleeding is not very material, since the blood-vessels have such a communication one with another, that blood taken from one vessel will therefore lessen the quantity in another, and thereby have a general effect: but when the cause for bleeding arises from disordered legs or feet, I would prefer bleeding in the toe. In most cases, however, the neck is preferable. The old writers on this subject mention thirty-one veins for bleeding. See Lawrence, vol. ii. p. 302.

† The length of that part of the lancet which ought to be applied to the vein, must be regulated by the thickness of the patient's skin.

‡ The quantity must be regulated according to the state of the animal, and nature of the disease. In a plethoric horse, and inflammatory disease, four

Phlebotomy is found necessary in all inflammatory cases, or when there is reason to expect inflammation from sprains, bruises, or other accidents; and is frequently of advantage to poor reduced subjects in an unhealthy state to animate circulation.

ROWELS OR ISSUES.

These are vents made for the discharging of humours, by making an incision in the part requisite,* about three-eighths of an inch long, separating the skin from the flesh, so as to admit a piece of leather about the size of a crown-piece, with a hole in the middle of it. The leather must be thin and pliable, and covered with lint or tow dipped in digestive ointment: when put in, the orifice must be closed with some tow dipped in the ointment. Should the operation be going to succeed, the surrounding parts will soon swell, and begin to discharge some simple humours,† which in two or three days will turn into a thick matter, when the rowel should be turned two or three times round with

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quarts are frequently and repeatedly taken; but in ordinary cases from one to two quarts at a time will be found sufficient.

Blood drawn from a horse, coagulating quickly, appearing like red jelly, and easily broken by touching with the finger, and having a small quantity of fluid resembling water floating on its surface, indicates health. But when the blood is slow in coagulating, the tenacity of the mass so great as almost to be impenetrable by the finger, and a light-coloured jelly exhibited on the top, the case is inflammatory, and bleeding may be advantageously repeated; while, on the other hand, if the blood is thin and watery, and has almost lost the power of coagulating, repeated bleeding will be highly injurious.—White's Compendium.

* The most common parts are the chest, shoulders, belly, hips, inside or outside of the thighs; but I would recommend placing them as near the stagnated humours (to be discharged) as possible. For further remarks and various opinions, see Lawrence, vol. ii. p. 295.

† When a rowel does not discharge properly, a little blistering liquid may be occasionally applied with a feather.

the finger every day; and when the discharge is found sufficient, it must be taken out, and the part washed for a few days with milk and water lukewarm. Rowels are generally applied with good success, to hidebound horses in a declining state, and for removing grease, stagnated humours, &c.

SETONS.

These are used for removing diseased swellings by drawing a piece of cord through them, and letting it remain until the discharge has abated, and swelling subsided; when it may be withdrawn, and the orifice healed with the application of some ointment. The operation is performed with a long thin sharp instrument, shapen like a dart at the point, with a gentle curve, called the seton needle. It is of various lengths, and must be suited to the size of the tumour to be discussed. When the swelling is ripe, enter the needle with a cord in it dipped in digestive ointment at the top, bringing it out at the bottom; and to insure a proper orifice, the instrument may be forced through the sound muscular flesh. The ends of the cord may be fastened together, or a button of wood attached to each end, by which it may be drawn up and down every day, to make the discharge greater, if found necessary.

BLISTERING.

This application is generally used in removing fixed chronic pains, or sit-fasts of either superfluous flesh or skin, and is simply used by rubbing on some blistering composition* all over the place to be removed or affected, previously cutting all the hair neatly from the place. After the blistering ointment has been well rubbed on, a little of it may be spread over the place with a warm knife. The horse must be prevented from touching the part blistered with his mouth, (as he will be very apt to do when it begins to operate,) by being tied up to the rack, or putting what is termed a cradle round his neck; either of which will prevent him from turning his head round in any direction.

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* See Blistering Ointments, in this section.

FIRING.

This operation requires a neat and experienced performer. It is done with a cautery, by making lines around the leg from the pastern nearly up to the knee; which lines must only be burnt so deep as properly to affect the skin, without injuring the sheaths of the tendons. The closer the lines are made, the operation is conceived to be more effectual: but it ought never to be performed without a previous resolution to give the animal to be fired four or five months run at grass, as soon as convenient; and on no account whatever to ride him, or put him to any other work during that period. Firing is found useful when the sinews of a horse's leg are relaxed, and is commonly used for strengthening the back sinews of the legs of young blood horses.

PHYSIC.

This medicine is generally administered in two ways, viz. either by being dissolved into a liquid state, or given in balls of an oblong shape, from three to four inches long, and from one and a half to two inches in diameter, tapered at both ends. When given in a liquid state, the horse's head should be elevated by a forked stick, put into a noose of cord placed in the mouth over the tushes, and the liquid put in by a drenching horn or glass bottle, giving no more at once than what the horse may swallow with ease at one 'go-down;' which, when fairly over, may be followed by another, and so on until it is finished. But when given in the form of a ball, it must be done with a small hand, the horse's tongue being drawn and held out of his mouth on the off-side: the operator then receives the ball, and placing it lengthwise between his fingers and thumb stretched out, delivers it with a jirk over the root of the tongue, which must be let go immediately on the hand's being taken out of the mouth. The operator then elevates the head a little, by putting his hand below the under jaw, and watches the passage of the ball; which, if perceived, may be followed by another, if necessary; but should the ball not be observed to pass down the gullet, (for some horses will hold them a long time, and then cough them up,) a little water may be put down with the horn; the swallowing of which may carry down the ball. But as this method requires an expert and experienced hand, it may be advisable for those who have never seen it done, to have recourse to the old method of administering balls by the iron.[*] In giving a purge to a horse, great care and attention are necessary as to proper treatment, both previously to and during the time it is operating. Should a horse, therefore, be upon hard keep, he ought to be prepared for receiving physic, by previously giving him a few bran mashes for a day or two. This, however, is not necessary for a horse just taken from grass; at which time he should have a more gentle dose, as from the state of the bowels at that period, the usual quantity[†] may irritate them too much, and cause inflammation, while less than the usual quantity will in general prove a sufficient purge. This should also be adhered to the first time that a horse receives a dose of physic. The physic may be given in the morning, after fasting a few hours, and the horse may, during the day, receive a small quantity of hay, with as many bran mashes and warm drinks as he will take. On the following morning, the horse may receive some gentle exercise, being well clothed during that time, and even in the stable, being exposed to neither cold nor wet. Should the purge seem to operate freely, he need not be taken out a second time: but if the desired effect is not accomplished, a little more exercise will be necessary, even to the extent of a sharp trot, without causing perspiration. During the time of operation, bran mashes and warm drinks must still be given; and when it begins to cease, he may receive a little corn, but must be put upon hard keep by degrees.

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[*] The iron is made of an oval shape, sufficiently long to extend the upper jaw from the under to its utmost limits (or nearly so) with a round ring in the middle, to admit the operator's hand and arm. The iron is generally fixed to the head like a bridle.

[†] For the usual quantities, see Purging Balls, in this section.

CLYSTERS.

These are used in cases of colic, and sometimes as a laxative after physic, when it does not operate; or when it operates too long or too powerfully, both restringent and nutritive clysters are used. They are generally classed under five heads, viz. anodyne, or common clyster, laxative, astringent, nutritive, and diuretic. The nutritive kind are of great service in keeping up the body, in cases when nourishment cannot be received through the proper channel. They are administered by injecting into the anus from a bag, which holds the liquid, with a pipe attached to convey it into the intestines. A large bladder will answer for the bag, and the pipe should be made of wood finely polished, or of ivory; being about 12 or 14 inches long, and one inch and a half in diameter, where it is fastened to the bag, tapering gradually to a fine rounded point. The hole in the pipe may be wide enough to admit a small funnel, through which the liquid may be poured into the bag. The horse's hind quarters being elevated a little, and the pipe greased, (which should be entered slowly and with great care, so as not to injure the gut,) press the bag gently until the liquid is all out, and after removing the bag, hold down the tail a few minutes. The liquid ought to be as warm as the common temperature of blood; and if of a diuretic or laxative nature, from two to three quarts may be injected at one time: but if of a restringent, anodyne, or nutritive kind, (intended to remain in the bowels,) from one pint to a quart is generally held sufficient. For the suitable ingredients, see recipes, p. 38.

MEDICINES.

As for my attempting to analyse them, it is out of the question, having already declared my ignorance on this subject. I shall therefore merely state the operative nature of some of the most predominant ingredients; so that if the proportions of them recommended in the following recipes have not at first the desired effect, they may be altered acccording to the nature of the case,* but with great caution and little variation.

CATHARTICS or LAXATIVES. Glauber and Epsom salts, jalap, senna, rhubarb, magnesia, calomel, castor oil, &c.—RESTRINGENTS. Oak-bark, laudanum, opium, &c.—DIURETICS. Common and Castile soap, Venice turpentine, nitre, rosin, roche-alum, &c.—CORDIALS. Peruvian bark, aniseeds, caraway seeds, &c.

RECIPES.

The following are a selection of recipes found upon experience to be composed of safe and effectual ingredients.

OINTMENTS.

Astringent Ointment for Grease.

No. 1.—	Hog's lard	4 oz.
	Oil of turpentine	2 dr.
	Acetated water of litharge	¼ oz.

No. 2.—	Venice turpentine	1 oz.
	Hog's lard	4 oz.
	Alum finely powdered	1 oz.

To be applied when the heels are ulcerated.

Mange Ointment.

No. 1.—	Sulphur vivum finely powdered	4 oz.
	Oil of turpentine	3 oz.

No. 2.—	Oil of turpentine	4 oz.
	Strong vitriolic acid	¼ oz.
	Mix cautiously, and add	
	Train oil	6 oz
	Sulphur vivum	4 oz.

Ointment for Sitfasts.

Ointment of marshmallows	4 oz.
Camphor	2 dr.
Oil of origanum	1 dr.

Mix, and apply till the callous part appears disposed to separate.

White's *Compendium.*

Digestive Ointment for Wounds.

Olive oil	1 pint
Yellow wax	4 oz.
Black rosin	4 oz.
Burgundy pitch and turpentine, of each	2 oz.

Melt the wax, rosin, and Burgundy pitch, in the oil over a slow fire; when taken off, stir in the turpentine. For large wounds, where a plentiful discharge is required, stir into this quantity three ounces of spirit of turpentine, that it may incorporate in getting cool.

Taplin's *Stable Directory.*

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* If laxative, increase the ingredients of that nature, if the purge has been too gentle; and diminish if too severe; and in like manner with restringents, diuretics, &c.

Blistering Ointments.

No. 1.—Spanish flies powdered	½ oz.
Oil of turpentine	1 oz.
Ointment of wax or hog's lard	4 oz.

No. 2.—Oil of turpentine	1 oz.
To which add gradually,	
Vitriolic acid	2 dr.
Hog's lard	4 oz.
Spanish flies powdered	1 oz.

No. 3.—Common tar	4 oz.
Vitriolic acid	2 dr.
Oil of origanum	½ oz.
Hog's lard	2 oz.
Spanish flies powdered	1½ or 2 oz.

Remarks.—The blister No. 3. is remarkably useful in removing enlargements of the back sinews, or windgalls. Sublimate is often recommended as an ingredient in blisters, but it is very apt to ulcerate the skin, and leave a permanent mark, or blemish; it is therefore omitted in the above formulæ; but in cases of bone spavin, in which severe blistering is necessary, it may be employed with advantage.

White's *Compendium.*

LOTIONS.

Astringent Lotions for Grease.

No. 1.—Alum powdered	1 oz.
Vitriolic acid	1 dr.
Water	1 pint.

No. 2.—Alum powdered	4 oz.
Vitriolated copper	½ oz.
Water	1½ pint.

No. 3.—Sugar of lead	4 oz.
Vinegar	6 oz.
Water	1 oz.

Mange Lotion.

White hellebore powdered	4 oz.
Boil in three pints of water to	1 qrt.
Dissolve muriate of quicksilver	2 dr.
In muriatic acid	3 dr.

Then mix.

Saturnine Lotion for Sprains.

No. 1.—Acetated lead	4 oz.
Vinegar and water, of each	1 pint.

White's *Compendium.*

No. 2.—Oil of wormwood	1 oz.
Oil of amber	½ oz.
Oil of origanum	½ oz.
Camphorated spirits	4 oz.
Opodeldoc	4 oz.

Rub well two or three times a day.

Taplin's *Stable Directory.*

LINIMENTS.

Mild Liniment for Canker.

No. 1.—Crystallized verdigris finely powdered	1 oz.
Honey	2 oz.
Powdered bole and alum, of each	½ oz.

Vinegar sufficient to give the consistence of a liniment; to be mixed together over a gentle fire, and applied every morning, the dressings being kept on by means of a bar-shoe.

Stronger Liniment for the same.

No. 2.—Oil of turpentine	1 oz.
Sulphuric acid	½ oz.
Mix cautiously together, and add tar	4 oz.

Strongest Liniment for the same.

No. 3.—Red nitrated quicksilver	1 oz.
Nitrous acid	2 oz.
Mix cautiously together, and add tar	4 oz.

WHITE's *Compendium of the Veterinary Art.*

Repellent Liniment for Spavins.

Cantharides in powder	1 dr.
Olive oil	2 oz.

Mix together, and let this be gradually rubbed upon the part till absorbed by the seat of disease, placing over it a piece of flannel, and fastening it on with an elbow bandage.

Repellent Liniment for Windgalls.

Oil of origanum	½ oz.
Spirits of turpentine	½ oz.
Camphorated spirits of wine	1 oz.

Mix together, and with a small portion of tow, sufficiently moisten the tumours twice every day, leaving a pledget wet upon each.

Taplin's *Stable Directory.*

Liniment for Wounds.

Oil of bays, elder ointment, and marshmallow ointment, of each four ounces; camphor, one ounce, dissolved in four ounces of spirit of turpentine, by rubbing in a marble mortar. Mix the whole together, and keep it well tied down in a pot for use.

Clater's *Cattle Doctor.*

Purging Balls.

No. 1.—Barbadoes aloes	5 dr.
Prepared natron	2 dr.
Aromatic powder	1 dr.

Syrup enough to form the ball,

No. 2.—Barbadoes aloes	7 dr.
Castile soap	½ oz.
Powdered ginger	1 dr.
Oil of caraways	10 drops.

No. 3.—Barbadoes aloes	1 oz.
Prepared natron	2 dr.
Aromatic powder	1 dr.
Oil of aniseeds	10 drops.

These balls are progressively stronger, but should stronger medicine be desirable, one or two drams of aloes may be added to No. 3, or one dram of calomel.*

Diuretic Balls. (For Grease.)

No. 1.—Castile soap	12 oz.
Yellow rosin in powder	8 oz.
Nitre in powder	8 oz.
Camphor in powder	1 oz.
Oil of juniper	6 dr.

(For Strangury.)

No. 2.—Castile soap	½ oz.
Nitre	2 dr.
Rosin	2 dr.
Compound powder of gum tragacanth	2 dr.
Opium in powder	10 grains.
Oil of juniper	30 drops.

N. B. Divide No. 1. into twelve balls, rolled up in liquorice or aniseed powder. Give one every other morning. Make No. 2. into one ball, well mixed, to be given and repeated as circumstances may require.

Taplin's *Farriery.*

Cordial Pectoral Ball.
(For Colds.)

Turkey figs, Spanish liquorice, aniseed in powder, liquorice powder, of each	4 oz.
Caraway seeds, elecampane, aniseed balsam, of each	2 oz.
Saffron, ginger in powder, and oil of aniseed, of each	6 dr.

Honey sufficient to form the mass.
Divide into 12 balls. Give one every morning.

Detergent Pectoral Ball.
(For Colds.)

Castile soap, aniseed powder, and liquorice powder, of each	5 oz.
Barbadoes tar	6 oz.
Gum ammoniacum	3 oz.
Balsam of Tolu	1 oz.

Honey to make a mass.
Divide into 12 balls. Give one every morning.

Taplin's *Farriery.*

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* When the above purging balls are not convenient, from about 20 to 24 ounces of Glauber salts will in most cases be found efficacious. Or when evacuating the contents of the intestines in a gentle manner (by means of a laxative) without any prolonged or violent discharge, is all that is necessary, about one half or three quarters of an English pint of castor oil, or about 1½ pint of olive or linseed oil, will be found sufficient: or, aloes half an ounce, Castile soap, three drams, and syrup enough to form a ball for one dose.

Anodyne Clysters. (For the Staggers, or against Worms.)

No. 1.—Take of rue, savin, and wormwood, each a handful; boil a quarter of an hour in two quarts of water, with four ounces of common salt; then strain, and add tincture of assafœtida, two ounces, olive oil, a quarter of a pint; and let it be thrown up moderately warm.

(For Scouring.)

No. 2.—Take boiled starch, of moderate consistence, three pints; gum arabic in powder, two ounces, liquid laudanum, half an ounce; cold drawn linseed oil, four ounces.

Carminative Clyster. (For Colic.)

Take camomile, marshmallows, wormwood, elder flowers, or rosemary, of any two most convenient, each a large handful; Jamaica pepper and senna, of each one ounce; ginger (bruised with the pepper) half an ounce; boil in two quarts of water for a quarter of an hour, strain off, pressing the ingredients; then add of olive oil and geneva, or brandy, each a quarter of a pint.

Emollient Diuretic Clyster. (For Strangury.)

Take of thin gruel, three pints; nitre, two ounces; gum arabic, one ounce and a half; olive oil, four ounces. Let it be injected moderately warm, and retained in the body as long as possible.

Taplin's *Stable Directory.*

Diuretic Clysters.

No. 1.—Soap, four ounces, dissolved in two quarts of warm water; salt, one handful.—Or, No. 2.—One ounce of Castile soap; two quarts of water; Venice turpentine, two ounces, well beat with the yolks of two eggs.

Lawrence's *Treatise on Horses.*

Domestic Clysters. (For Fevers.)

Take water gruel, two quarts; coarse sugar, half a pound; common salt, four ounces (or a single handful); olive oil, a quarter of a pint. Mix together, and inject moderately warm.

Laxative Clysters.

No. 1.—Take of camomile flowers, sweet fennel, and coriander seeds bruised, of each one ounce; caraway seeds, half an ounce; boil in two quarts of water, till reduced to three pints; then strain, and add for solution, while hot, of Epsom salts, two ounces; and when nearly cool enough to administer, add of olive oil, and tincture of senna, (commonly called Daffy's elixir,) of each a quarter of a pint.

(For Pleurisy.)

No. 2.—Take two quarts of common gruel; coarse sugar, six ounces; Glauber salts, four ounces; tincture of jalap, two ounces; olive oil, a quarter of a pint. This must be repeated in twenty-four hours, or oftener if necessary.

(For Colic.)

No. 3.—Take of common gruel, three pints; Epsom salts, four ounces; tincture of senna and olive oil, each a quarter of a pint.

Taplin's *Stable Directory*.

Nutritive Clyster.

Thick water gruel, or, broth made of sheep's head, trotters, or the like, but not too fat. Milk pottage. Rice-milk strained, with warm aromatic seeds, if necessary.

Lawrence's *Treatise on Horses*.

POULTICES.

Common Poultice.

Milk, half a pint; salad oil, three large spoonfuls; grated bread, enough for due consistence. Add the bread to the milk when boiling, afterwards beat in the oil thoroughly.

Suppurative or Ripening Poultice for the Strangles.

Leaves of mallows and marshmallows, green or dry, twenty handfuls; white lily root washed and pounded, half a pound; linseed and fenugreek seeds bruised, four ounces each; boil very soft and pulpy, and add elder ointment, four ounces; and lard as much as needful. Mix, and keep for use.

Common Digestive Poultice for Grease, &c.

Boil ground oatmeal, and strong beer grounds; add lard enough to supple it. From two to four ounces of turpentine may be added to the foregoing. Or, lily roots, linseed, and rye flour.

Resolvent.

Onions and camomile flowers properly boiled and mixed; add goose-grease, or for want of it, neat's-foot oil. This is very efficacious to disperse swellings. Or, with oatmeal, cummin seeds powdered, two ounces; and powdered camphor, half an ounce; or sal ammoniac dissolved in British spirit. Proper in bruises, and to disperse coagulated blood.

Anodyne.

Boil camomile, elder leaves, or flowers, poppy, bay leaves, and rosemary, with oatmeal; mix with elder ointment and a little camphorated brandy.

Repellent and Restringent.

Dissolve alum in vinegar, or verjuice; add half the quantity of oil with red wine lees, or stale beer grounds, and bean-meal. Or, old verjuice, or distilled vinegar, one quart; alum, one ounce; currier's shavings, or oak-bark; boil to a poultice, with or without saturnine ointment, and apply warm twice a day.

Lawrence's *Treatise on Horses.*

Fomentation for Swollen Wounds.

Camomile flowers, four ounces; twelve white poppy-heads; half a pound of bruised linseed; marshmallow roots, and elder leaves bruised, of each one handful. Boil in two gallons of ale-dregs.

Clater's *Cattle Doctor.*

Styptic for Wounds.

Roche-alum and blue vitriol, three ounces each; spring water, one quart; boil till dissolved, filter, and add oil of vitriol, half an ounce.

Lawrence's *Treatise on Horses.*

DISEASES.

WORMS.

This is generally the first natural disorder to which horses are subject. They mostly prevail in young horses from one to five years old, but in some cases at all ages.

Symptoms.—A voracious appetite, bad condition, with a staring coat and bad breath. The horse will likewise rub his tail much, heave at the flanks now and then, looking round to them and striking his belly with his hind feet. The excrement is often mixed with yellow matter, and sometimes the worms make their appearance in it. A whitish coloured powder beneath the anus likewise indicates worms or bots in the intestines.

Cure.—A few doses of castor oil, * repeated once a week, will in general prove an effectual remedy. But in obstinate and neglected cases, an occasional purging ball may be given, or the clyster No. 1.

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* For the above doses, see note, page 37.

LAMPAS.

Symptoms.—This disease is known from the flesh's growing equally with or above the level of the upper fore teeth, so as to prevent the horse from chewing his food. This is likewise a natural disease among young horses, generally when about three or four years old.

Cure.—It is sometimes removed by cutting the tumorous part with a knife, in several places, so as to make it bleed freely: but this I have found sometimes to be only a temporary cure, and therefore had recourse to burning down the superfluous flesh with the cautery, by touching lightly, taking great care not to go so deep as to injure the thin bone that lies under the upper bars, and anointing the part with a little spirits. Some writers have condemned this burning system; but as I have repeatedly found it to be a never failing remedy, without leaving any bad effect, I do not hesitate to recommend it as a safe and certain cure.

STRANGLES.

This is another (and the only other most prevalent) natural disease among young horses, which are generally most subject to it from three to five years old. But from the diseases being contagious * and epidemical, aged horses are likewise known to be afflicted with it; and it is generally brought on either by infection or a neglected cold.

Symptoms.—These are, a discharge of thick white matter at the nose, hot breath, cough and feverishness, a swelling between the jaw-bones, which increases for about six days, when it will in general break, and discharge large quantities of matter; in which case the disease is favourable, all other symptoms generally being speedily removed. But when the attack is more severe, the throat is sometimes so

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* I am not a little surprised to find some writers hesitating as to the contagiousness of this disease; for I have invariably found that when a colt took it at grass, he infected all his companions, and likewise when in the stable in the same manner.

much swollen, that the animal is incapable of swallowing either food or water, and becomes quite feverish. The first symptoms of this disease are, a dulness, watery eyes, accompanied with a slight cough, and swelling between the jaws. It appears to be a voluntary effort of nature to discharge superfluous humours, and ought to be assisted by art, should the aspect of the case demand it.

PREVENTIVES.—Due attention to the treatment recommended in a subsequent page for cold, and the necessary precautions against infection,* are the only preventives which this disease may be said to admit of.

CURE.—Young horses seized with this disorder while running at grass, generally get rid of it without any artificial means, or having any bad effect left behind, particularly in a mild climate or season. But should the weather be in the least cold, the horse so affected should be instantly put into a warm stable, to prevent (as Mr. Lawrence justly remarks) the discharge from being checked by the repulsive property of cold air, and a part of the disease (from insufficient solution) from being left in the habit, and re-appearing in time under the guise and denomination of *Vives*.† Seeing, therefore, that this disorder among young horses generally heals of itself, it would appear advisable for the horse that is so affected in the stable to be reduced to as near the same habit of body (with a proportion of free air and exercise) as the one running in the fields. This may be accomplished by keeping the bowels open with bran mashes, and allowing him to run loose in a well-aired house, occasionally turning him out to a field for a few hours, during the day, when the weather is warm and dry, but never without a hood, and the swollen gland well secured from cold. On the first appearance of this disease, let the horse so affected be put into a separate apartment, and clip off the hair from the inflamed gland and parts contiguous; and, after rubbing it with some of the stimulating ointment, * apply the suppurative poultice, already noticed for this disease, when moderately warm, and never allow it to remain on when cold. The poultice must be repeated until the swelling is brought to a height, and ready to burst of itself; when an orifice may be made with a knife or lancet, and the discharge assisted by a slight pressure of the fingers. The orifice must be filled with a tent of tow or lint dipped in digestive ointment, so as to keep the wound open and admit the matter to discharge freely. The poultice must be continued until the swelling is reduced; the horse's head frequently steamed over boiled hay or bran mashes to encourage the discharge; and no repellent must be used. A horse taken from grass, affected with this disease, may be treated in the same manner, by giving cut grass, and changing the regimen as little as possible. Should the internal part of the throat be so much

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* Avoid all intercourse with infected animals, and clean out all houses which have been occupied by them, covering the floor, and all other contaminated parts, with quicklime, some time previous to any clean horses being admitted.

† I once lost a cream-coloured five years old blood mare from a neglect (or rather from ignorance) of the above nature, which I had sold (but not delivered) a few weeks previously to her death at one hundred guineas. I had, agreeably to what I have recommended in a former part of this chapter, put this mare to the horse, (Podargus,) to prevent her from being too much rode until six years old. She was seized with the strangles before I put her to the horse; and, from having seen so many young horses recover from that disorder while at grass, (and without taking the time or nature of the season into consideration,) I resolved to allow her to 'run it off' at grass; which was to all appearance accomplished. But in the course of the following spring a return of running at the nose commenced, and in a few weeks she became very ill, and was seized with severe fits of colic. I then called in the assistance of an experienced farrier, who stood high in the veterinary school; but all to no purpose, as my hundred guineas soon vanished among his hands. He however convinced me that a neglected strangles was the cause; which I should have been glad to have discovered, (had I not paid so high for the discovery,) as I had puzzled my brain very much about the nature of the disease before the arrival of the farrier. Upon dissecting the mare, the farrier dis-

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covered more clearly, that a neglected strangles was the sole cause of death; which he took some pains to convince me was the case. But the principal discovery which I made from the dissection was a young *Podargus*, (for which I had, the preceding summer paid five guineas,) possessing all the beauty, in shape and colour, of its dam; which, if she had lived, would have made its appearance in a more pleasant manner about a month afterwards.

* The ointment already mentioned for *sitfasts* will answer the above purpose with the alteration of two ounces of spermaceti ointment instead of the four ounces of marshmallows. Some, however, recommend and prefer fomenting with elder-leaves, white lily roots, &c. to anointing with the above ointment, previously to the application of the poultice; and holding a lighted candle to the part affected, to make it break sooner, instead of making an incision with the lancet.

swollen as to prevent the swallowing of food, it will be of great advantage to apply a blister, and keep the bowels open with clysters. If the strangles is apprehended from a neglected cold, but not confirmed by any of the advanced symptoms, bleeding is found very beneficial. After the strangles is healed, should a cough remain, the following alterative ball may be given every morning until a gentle purging is produced; and, if found necessary, repeated after an interval of four or five days: "Barbadoes aloes, 1½ dr.; emetic tartar and Castile soap, of each 2 dr." The head, neck, chest, and body, should all be well clothed, warm water frequently given in small quantities, the horse well littered, and his legs well hand-rubbed. (Taplin's *Stable Directory*. White's *Compendium*.)

INFLAMED OR MORBID EYES.

If an eye is inflamed so much as to be swollen, closed, and weeping, it should first be carefully examined, and searched with a soft rag, to see if the cause has not proceeded from a hay-seed, chaff-pickle, or any other similar intruder; and if found to proceed from this alone, after removing the seed or pickle, * all that I have ever found necessary was to bathe repeatedly for a few days with fresh milk and water lukewarm, and occasionally to apply bread and milk poultice. Should the inflammation proceed from a stroke, first bleed, and then bathe as above. But should the eye be morbid, and occasionally inflamed, bleed and give laxatives; and in severe cases, where blindness is likely to be the result, issues upon the cheeks, under the throat, and even in the chest and belly, will be found of great advantage. Bran poultices must be constantly kept upon the eye, and afterwards mild liniments may be used; and light must be excluded until a complete recovery is effected. Should a web or speck be left upon the eye, from whatever cause, reduce crystal glass to a fine powder, and blow a small quantity into the eye with a quill once a day until it is removed. Bracken recommends powdered glass mixed with honey, and, previously to using the ointment, washing the eye with skim-milk and aqua-vegeto; while Gibson, another writer on the diseases of horses, recommends, white vitriol, one drachm, white sugar-candy, half an ounce, ground very fine, and blown into the eye once a day. Both of these prescriptions may be very good; but the success of the pounded glass alone has hitherto prevented me from knowing the good or bad effects of any other application. No remedies of such a nature, however, should be used, until all inflammation be subsided, and a satisfactory discovery made, that the defect to be removed is a web upon the eye, and not a dimness; for if the latter, the above applications will only torture without effect.

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* When any thing is perceived in the eye, but in such a situation as not easily to be removed, it is best done by placing the end of a silk handerchief on the top of a wooden pin or quill. The pin or quill must, however, be held very loosely between the finger and thumb, so that if the horse should move his head quickly toward the pin, it may be pushed out of the hand; whereas, if firmly held, it might injure the eye.

GLANDERS.

This disease has been found from experience to originate either from a neglected cold, strangles, or infection.[*] Experience has likewise shown that it is a fatal disease, and that a cure is not to be attempted by an ignorant or inexperienced person, as it has baffled the most experienced veterinarians; some of whom maintain that it is incurable, while others assert that they have already effected cures. But I am convinced, from the little experience which I have had in this disease, that the grand point to be aimed at is a preventive; which can only be accomplished by paying proper attention to the original causes already mentioned. I am further persuaded, that the person attending to such precautions will have more to boast of than the one who is more willing to attempt a cure. But should a valuable horse be infected with this fatal disease, it might be advisable (or at least satisfactory) to attempt a cure; which, if effected at all, must be in a very early stage of the disease. In order, therefore, to authorize the attempting of a cure, or to prevent the injurious effects of contagion, the following remarks will, I trust, lead to an early and certain discovery of the malady.

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[*] It is to me very surprising that even one writer on this disease has declared it not infectious. (See Lawrence, vol. ii. p. 346.) It is fortunate, however, that the fact of its being highly so, is now so clearly established, that there is scarcely an old wife in the country but will tell you the danger of trusting to such an opinion.

SYMPTOMS.—These are, a hardness and an insensibility of swollen glands under the throat, a discharge of thick matter from one or both nostrils, of a bad colour and smell, which becomes, at an advanced stage, very fetid and tinged with blood. There is no difference in the appearance of the body, it being neither feverish nor dull; but the horse eats and thrives equally well as if not affected, the animal functions being all regular, until the disease is of an old standing, when the hair will come off with the slightest pull, and the excrement have a putrid appearance. This disease is sometimes mistaken for the strangles or cold, but may easily be distinguished in the following manner. In the strangles, the swollen gland feels painful, and soon begins to suppurate; while, in the glanders, it becomes quite callous. Colds are generally accompanied with a cough, dull and watery eyes, a loss of appetite, and less or more of fever; while the glanders is not so. In colds, the swollen gland feels soft, loose, and moveable under the skin, hot to the touch, and generally much inflamed; while the reverse is the case in the glanders. In colds, the discharge is most frequently from both nostrils, which are free from ulceration; while in the glanders, the discharge is more frequently from one nostril, and always accompanied with ulceration, either at the commencement of the disease or some time after.

Having now given such a description as, I trust, will lead to an early and true discovery of this disease, and taking it for granted, that its contagious effects are generally admitted, if not felt in the purse, I hope it is quite unnecessary to say any thing as to the propriety of immediately removing a horse with any of the above symptoms upon him to some separate apartment, free from all intercourse with his own species. Should the glands of the throat be enlarged and inflamed, with a discharge at the nostrils, the following treatment (recommended by Mr. White) will soon effect a cure, should the discharge proceed from cold alone. Apply a large poultice to the swollen gland, steam the head three or four times a day, and keep the horse well clothed, particularly about the head, and give him the following powder every day, or once in twelve hours: Powdered nitre, one ounce, mixed with unwashed calx of antimony, one ounce. Should, however, the ulceration in the nose be considerable, and the glanders confirmed by the other concomitant symptoms, I must here decline prescribing a cure, for the best of reasons, that I never effected or saw one effected. But those who may be inclined to try such an experiment, may perhaps find some assistance from Lawrence's *Treatise on Horses*, vol. ii. p. 344, where the opinions of Darwin, Bracken, St. Bel, and various other ancient writers, are given; many of whom do not hesitate to insist upon a cure. As to our modern veterinary writers on this subject, they seem mostly to agree in declaring a confirmed glanders incurable.

I shall now conclude my remarks by urging the necessity of purifying stables in which infected horses have been kept,* previously to allowing a clean horse even to breathe under the same roof.

COLIC.

This disease is very common, troublesome, and dangerous, and may be divided into four kinds, viz. the common fret or gripes, the flatulent, inflammatory, and bilious colic.

SYMPTOMS.—The first of these kinds may be distinguished by the horse's dulness, seeming uneasiness, rejection of food, looking round to the seat of complaint, striking with the feet, voiding excrement in small quantities, endeavouring to stale, suddenly lying down and rising in great agitation. As the complaint increases, the animal becomes more and more restless, groans, and rolls more about when lying, kicks at his belly and becomes feverish, has a cold moisture at the root of his ears and flanks, and at intervals of ease begins to perspire copiously over the whole body. The second description of colic mentioned above, has generally all those symptoms, with the addition of fulness in the belly, intonation of the air contained in the intestines, and a more frequent strangury perceptible by ineffectual attempts to stale. The third has most of the symptoms of the first, the horse feeling more pain on pressing his belly or flanks, and having a continual straining but ineffectual endeavour to void excrement; the discharge being only a small quantity of discoloured hot liquid. The fourth, being generally of an inflammatory nature, is known by the same symptoms and treated in the same manner as the third; and as in the common gripes flatulency generally constitutes a part of the disease, (or increases it,) consequently colic may be dealt with as only of two kinds, viz. the flatulent or spasmodic, and inflammatory or bilious. Great caution, however, is necessary in making a proper distinction between the two, the treatment being different, as some of the ingredients found so efficacious in effecting a cure in the one not unfrequently prove fatal in the other.* It may therefore not be improper to connect the symptoms with the cause, in order to assist in properly discriminating the nature of the colic.

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* Every thing whereon a glandered horse has deposited any matter, ought either to be removed or well washed with soap and hot water, and the stable or house afterwards whitewashed with a thick coat of quicklime. Or, fumigate as directed in chap. ii. sect. 5. art. Neat Cattle.

FLATULENT OR SPASMODIC COLIC.

This species of colic proceeds from various causes. Delicate or washy horses are sometimes seized with it from sudden transitions from heat to cold, but more frequently from drinking cold water while warm, or getting frosty water without exercise after it. Horses receiving food not so easily digested as that to which they have been accustomed, as bad hay or oats, &c. are apt to be affected with this colic, and likewise after receiving new oats, beans, potatoes, or even succulent green food, particularly when first given, and in immoderate quantities. Crib-biters, from their constantly sucking air, are very subject to the windy gripes. Should a horse have been exposed to any of the above causes, immediately preceding the attack, without showing any of the particular symptoms exclusively attached to inflammatory colic, the disorder may be dealt with as spasmodic or flatulent.

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* Opium, laudanum, gin, brandy, &c. given in drenches, are found successful for flatulent or spasmodic colic; while they are found to be very injurious in inflammatory cases.

N. B.—From a mistake of the above description, I am convinced that I once killed a good cart mare of my own, by repeating a dose of laudanum and neglecting to bleed.

CURE.—Should the horse have appeared dull, previously to the attack, take first a little blood from him, and after removing (with a small hand well greased) as much excrement from the great gut as can be conveniently reached, inject a clyster lukewarm, five or six quarts of water or water-gruel, with a large handful of common salt, and half a pint of oil. The same quantity may be given as a drench,* if thought necessary; and while these are preparing, the horse must be walked quickly, or trotted gently about with dry clothes upon him. During the period of performing the necessary operations, or while the colic remains upon the horse, he ought to be put into a stable without stalls, well aired, and moderately cool, having plenty of litter, so that he may roll freely without injury. A person should be placed at the head to prevent its being hurt, and two men constantly employed in rubbing the belly hard with straw wisps, (which has a good effect in dispelling wind,) but with intervals of rest, so that the horse may have time to stale or void excrement. Should he have been lying for some time, and be quite wet from perspiration when he rises, he should be rubbed dry, and still kept well clothed. I have frequently, by such treatment alone, cured this complaint without having recourse to the apothecary; and although it might be found ineffectual, it is a necessary and preparatory step to other remedies, should the circumstances of the case demand them. Allowing then that the simple treatment, already prescribed, proves ineffectual, the carminative clyster† may be injected, and one pint of water-gruel, half an

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* Instead of the above drench, half an English pint of spirits mixed with the same quantity of sweet oil, and diluted, if too strong, with thin gruel, will frequently afford immediate relief.

† For the above clyster, see page 38. But as clysters may not always be advisable, or medicines convenient, the following domestic remedies for flatulent colic, prescribed by Mr. White, will frequently be found of great service :—

English pint of castor oil, with an ounce or two of laudanum, or tincture of opium, may be given as a drench. When the colic was of a laxative nature, I have frequently effected a cure with one quart of lukewarm beer, mixed with a table-spoonful of powdered ginger, and a small wine-glassful of laudanum; and when not effectual, repeated half the quantity in half an hour. After the colic appears to be cured, and the pain completely abated, if it has been attended with costiveness, give a laxative drench; but if of a laxative nature, and cured from the application of laudanum, nothing more of an astringent nature will be found necessary. For the convenience of travellers, who may frequently be so situate as not to have easy access to draughts of liquid medicine, when their horses are seized with colic, Mr. White has given the following useful recipe: "Castile soap, three drams; camphor, two drams; ginger, one dram and a half; and Venice turpentine, six drams: to be made into a ball for one dose." This ball will keep a considerable time without losing its power, provided it is closely wrapped up in a piece of bladder.

INFLAMMATORY OR BILIOUS COLIC.

This colic generally originates from some internal injury by hard straining or overpowering exercise, improper use of purgatives, or giving those of too severe a nature, cold thrown in upon the intestines during the time of physic or otherwise; and sometimes from a long continued pain, and struggling under the colic already described. It is, however, most frequently brought on by costiveness, with great accumulation of hardened excrement. Should the horse have been exposed to any of these causes, previously to the attack, and his eye and anus appear red and inflamed, or if he exhibit any of the other symptoms already noticed for this disease, the colic may then be affirmed to be of an inflammatory nature, and dealt with accordingly.

No. 1. A pint of strong peppermint water, with about four ounces of gin, and any kind of spice.

2. A pint of port wine, with spice or ginger.

3. Half a pint of gin, diluted with four ounces of water and a little ginger.

Cure.—Copious bleeding, and discharging the intestines with cooling laxative drenches and clysters, avoiding all spirituous liquors, as opium, laudanum, or any spices of such a nature as may tend to heat or increase the inflammation. The laxative clyster No. 3. may be given without much intermission, until a change is effected; and the following drench, recommended by Taplin, may be given, and repeated, if found necessary: "Senna, one ounce; caraway seeds, bruised, and cream of tartar, of each half an ounce; boil them for ten minutes in three quarters of a pint of water, in which dissolve four ounces of Glauber salts; strain and add one ounce of tincture of jalap."

Great care and attention are requisite after any kind of colic, but more especially one of this nature. The horse should be kept moderately warm, and receive his drink a little warm, and not be exposed to cold, or undergo any fatigue until quite recovered. A few bran mashes and a gentle dose of physic may be given about a week after the cure, so as to remove all obstructions which might occasion a second attack.

GREASE.

This disease proceeds from want of regular exercise, which causes humours to accumulate in the legs and heels; but it also arises from an impure state of the blood, which may be observed from some horses being affected, even although receiving regular and constant exercise.

Symptoms.—A swelling of the hind legs; and if this be not soon removed, there ensues a discharge of fetid matter from the heels, which frequently become ulcerated.

Preventive and Cure.—The best, in this case, are, to keep the bowels open, and give regular exercise, as it may be observed that horses running at grass are seldom or never affected with grease; and those which are infected are cured on being turned out to grass. However, notwithstanding that a run at grass will cure this disease, it will likewise bring it on when the necessary precautions are not adopted immediately on taking a horse from grass.*

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* See treatment for horses on coming from grass, page 20.

When this disease is taken in its first stage, bleeding, and a few diuretic balls, (see *recipe*, p. 37,) with gentle exercise, and hand-rubbing the legs, will generally be found sufficient to effect a cure. If the legs are much inflamed and swollen, the heels may be poulticed,* and a dose of physic given; and as soon as the swelling is abated, the poultice may be discontinued, and an astringent lotion applied four or five times a day; and if the heels are ulcerated, apply astringent ointment. (See *recipes*, p. 34.) Should the disease be of a long standing, and the animal subject to it before, it will be more difficult to remove: in which case give the following alterative powder in a feed of corn every day, until it produces a very considerable diuretic effect: Nitre and rosin in powder, of each four ounces, mixed and divided into eight doses. When the disease appears to be of an obstinate nature, it is found necessary to put rowels in the thigh or belly.

RHEUMATISM.

This disease is a chronic local cold. The greatest difficulty lies in discriminating it from other diseases, and in precisely discovering the seat of complaint. Various parts of the body are affected with this malady, but more frequently the hind quarters, and particularly about the hip-joint. When the lameness appears to proceed sometimes from one quarter, and sometimes from another, it is a moveable rheumatism, and may be cured by bleeding, repeated sweatings, with a burden of clothes, and walking exercise. A mercurial purge may be given, if found necessary. But if the rheumatism be a fixture, which at first is only to be discovered by a lameness constantly in the same quarter, with no perceptible cause† for it, sometimes pressing with the fingers will discover the seat of pain; but when chronic, a wasting of the place affected too visibly leads to a discovery of the complaint. When this is the case, the best remedy is blistering or setons upon the place affected.*

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* See poultice for grease, page 39; or pour a sufficient quantity of boiling water upon one quart of fine bran, so as to make a thin paste, and add linseed powder enough to give it proper consistence, keeping it always moist, by adding occasionally a little warm water. (White's *Compendium*.)

† The perceptible causes may be a hurt in the legs, feet, &c. or ring-bones, curbs, spavins, splints, &c.

BROKEN WIND, PURSIVENESS, AND ASTHMA.

These are different stages of the same disease. The two last are soon perceived by the horse's being put to any exertion, while the former in general does not require it, but is easily distinguished by a quick irregular heaving of the flanks, and more than ordinary expansion of the nostrils. Sometimes the animal has a consumptive appearance: this, however, is not a just criterion; for I have had horses in this state quite fat, and likewise a mare which (contrary to the general opinion) had foals. This disease is generally allowed to proceed from over-exertion, improper stable-management, such as sudden transition from heat to cold; or from being allowed to eat immoderate quantities of fine soft hay, encouraged by large bellyfuls of water, with perhaps little or no exercise, or if otherwise, too severe, when the intestines are overstuffed.† As a proof that aliment alone will bring on this disease in countries where horses are fed upon fine natural hay, broken winded horses are not rare, and pursive ones very common. But the wind of such horses may be much improved (if not completely cured‡) by feeding for a time with coarser food, and a limited quantity of water. But as to the broken wind occasioned by over-exertion, &c. I am of opinion that such is incurable, as all attempts at cure, which I have either seen or heard of, invariably ended in only benefiting the venders of medicine. A preventive is therefore the principal object to be attained in this disease, which can only be accomplished by guarding against improper treatment of every kind, particularly that included in the causes already assigned for its origin. However, the usefulness of a broken winded horse in some cases may be greatly increased by giving a due proportion of suitable food, and a sparing allowance of liquids. Pasture clear of clover seems the food best adapted for pursive horses in summer; and in winter, hard hay, likewise free of clover, or oat straw, with a quart or two of lime or tar water (about three times stronger than the common) in the drink.

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* Other remedies are held out by some writers, such as embrocations, warm baths, swimming, &c.

† Some horses are naturally asthmatic, which require regular exercise, and the bowels to be kept open.

‡ Some years ago, I was at a horse fair in Preston, (Lancashire) where I purchased some draught horses for my own farming purposes; one of which was so apparently cheap, that it baffled all the little skill I was possessed of, and others of superior judgment and much longer experience, to find out the fault; for the price plainly testified that he had one. I at last concluded that he must have been stolen, and became anxious to find my man again; but he was neither to be seen nor heard of. I then went to the stable, in about an hour after the general inspection of the horse, (when he was declared stolen,) and found him heaving excessively at the flanks; in short, exhibiting all the convincing symptoms of broken wind. I was then satisfied that the horse had not been stolen, but that part of my purse had, from the man's having given him something to prevent a discovery of the disease for at least some hours. I was, however, reluctantly obliged to take the horse

CATARRH OR COLD.

This disease may justly be called the mother* of most of the fatal disorders that attend the horse, and in many cases proves a good nurse, particularly in a relapse. But mothers and nurses of this description ought to be dispensed with in cases of disease: proper attention to a catarrh at its commencement will therefore be found to be one of their greatest enemies. This is the time to make an hour go as far as a day, and a penny as far as a shilling, in effecting either a cure of the present malady or any of its attendants. This is the time for the sluggard and miser to exert themselves; the one, to prevent too much of his at-

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home, and make the most of a bad bargain. I immediately put him upon oat straw and oats, with little water at once: he wrought for some time apparently in great distress; but in course of a few months, he became quite sound, and master of any ordinary work; and although I could have several times got a very handsome profit upon him, yet he became so good a worker, that I resolved upon working him out, which I did in about ten years.

* A moment's reflection will almost prove the above parentage, as it has already been shown, as well as confirmed by experience, that glanders, rheumatism, fever, inflammation, and many other fatal disorders, when their origins are properly traced, are almost invariably founded upon a neglected cold.

tention from being afterwards demanded; the other, too much of his purse. This is the time for the industrious man to forward his work, save his cash, time, and property. This is the time to starve* the doctor and druggist.

Catarrh is either fortuitous or epidemic; the symptoms of the former are either cold and chilly, or hot and feverish, while those of the latter are more frequently of a feverish nature. Fortuitous catarrh generally originates in a sudden transition from heat to cold, or in a too long exposure of the body to the bracing influence of the cold air, by which the pores of the skin are closed, the perspirable matter is repelled into the habit, and sooner or later the nostrils become the channel for discharging the obstructed matter. The epidemic cold or influenza arises from an atmospheric infection, producing similar effects and symptoms upon the body as above mentioned.

The symptoms of catarrh in its first stage are simple, and easily known by a slight cough, hanging down of the head, with a running of lymph at the eyes and nostrils; but when the disease is of an older standing, the discharge at the nostrils is more considerable, and the glands under the jaw are swollen, and accompanied with a falling off of appetite. The first and most essential consideration, previously to any cure's being attempted, is to ascertain whether the catarrh is of a chilly or feverish nature, the requisite treatments being diametrically opposite; the former requiring a load of clothes, and medicine of a warm and evaporating nature, to create, as it were, a temporary fever, in order to bring the disease to a head; but in the latter case, the symptomatic fever already exists, when the requisites are bleeding and cooling diuretic medicine.

CURE.—Catarrh, when taken on the appearance of the first symptoms, as already described, I have repeatedly cured, by keeping my patient in the stable for a day or two, giving lukewarm water and mashes, and clothing so as to cause perspiration, and taking a little blood. Mr. Lawrence recommends, in addition to the above, spirit, or salt of hartshorn, in warm ale, sweetened with syrup of poppies. Two or three table-spoonfuls of the hartshorn may be given for a dose in a quart of beer twice a day. Fresh-ground ginger, from two to four drams, is an excellent substitute for the hartshorn. But when the disease, from neglect or otherwise, has acquired the second symptoms described, other measures must be immediately adopted. If it is of a hot and feverish nature, bleed the horse, and keep him lightly clothed, free from damp, with a hood on, if the throat is much swollen. The stable must be well aired, but not cold. Give the following, in a ball or drink, twice or thrice a day, with a plentiful supply of warm gruel or meal and water:—"Nitre and cream of tartar, of each one ounce; juniper berries fresh and good, powdered, one ounce; Spanish liquorice melted, half an ounce, or enough to sweeten with; work them up with liquorice powder, or flour." (Lawrence's *Treatise on Horses.*) Should the fever not be abated upon the third day, bleed again, and continue the balls; if the weather is fine, the horse may be walked out half an hour in the heat of the day, well covered with a hood and body-clothes, and led about gently, not mounted. Should the discharge from the nostrils be great, the manger and stall ought to be frequently cleaned out, and the latter supplied with fresh straw. No food should be allowed to remain and become tainted: in short, cleanliness, in every respect, must be strictly adhered to. Only a moderate portion of food should be given, and in case of much fever, little or none; but rather adhere to the old adage, "Starve a fever and feed a cold." Should the horse's head appear heavy, and the discharge little, (which may be caused from a stoppage of matter, not finding a free channel,) Dr. Bracken prescribes the following recipe: "Half an ounce of the dried leaves of the herb *asara bacca*, white hellebore, one drachm; powder fine, and keep it corked up. Blow a small quantity of this snuff through a quill, up the nostrils, two or three times a day." I have, however, found that steaming the head over warm water, with scalded hay, &c. is fully as efficacious as any other application. A few days after the fever is abated, and the cold seems to be entirely removed, (in order to cleanse the habit from all dregs of the disease,) give a mild aloetic purge, such as No. 1. page 37, or the detergent pectoral ball, *ibid.;* which will likewise remove from the constitution the seeds generally left by the most dangerous chronic disorders. I hope it is unnecessary to say any thing to impress the necessity of not exposing the patient to either cold or fatigue for some time, and of not putting him to work until all appearance of the complaint be completely removed, and the appetite recovered. Should a violent irritating cough remain, Mr. Lawrence recommends the following drink to be given, a pint or two at a time, lukewarm, at discretion:—"Raisins stoned, half a pound; liquorice root, split or bruised, three ounces; white horehound, three ounces; linseed, two ounces; nitre, two ounces; infuse in four or five quarts boiling water, and let the whole stand covered up two or three hours; strain off, without pressing, for use."

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* Although I have used the word starve, it must only be taken in a figurative sense, as I wish every honest, industrious man to live by his profession; yet it is not my wish that a neglected cold should constitute a part of the doctor's or druggist's living; for there are too many accidental and unavoidable cases, (where the prescriptions of the one and the ingredients of the other are equally availing,) which are in general sufficient for that purpose.

When the cough is not violent, but of a ticklish nature, the following will repress it, and heal inward soreness:—"Solution of gum Arabic, or tragacanth, with honey." But should the catarrh be of a chilly nature, with little discharge at the nostrils, and of so obstinate a kind as not to be removed by the first simple treatment, it will be necessary to bring the disease to a height, by clothing well, and giving warm cordial and stimulating medicines,* and mashes, &c. When this treatment has brought the disease to a crisis, it may be reduced in the manner already described for catarrh in a warm and feverish state, with the exception of no bleeding, unless the medicine has encouraged the disease too much, by carrying it past the desired pitch, and caused a raging fever. Dr. Bracken relates his success in running a horse a four-mile sweat, in order to bring the cold to a crisis; but bringing the patient into a high state of perspiration, by gentle exercise and heavy clothing, will be found more applicable, less dangerous, and equally efficacious.

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* The cordial pectoral ball may be given as directed in page 37.

CONTRACTED SINEWS.

This disease (if I may so call it) generally proceeds from improper treatment, or hard work, and is not unfrequently the effects of both. When a cure is not attempted in due time, the back sinews of the leg become so much contracted, the whole frame sometimes so much reduced, and constitution broke, as to render horses so affected entirely useless. There are various attempts made to recover horses from this inactive or useless state. Some, through ignorance, or rather from an unwillingness to part with the horse's services for any length of time, allow him to remain idle in the stable for some weeks; administer physic, to restore the constitution or appetite; bandage up the contracted sinews; and apply some strong liquids. But this too frequently ends in a temporary cure, with a relapse in a few weeks after being put to work. Others very properly give a summer's run at grass; which is evidently the best method of restoring the appetite or constitution. But a winter's run is more frequently given and preferred, which, I suppose, from the treatment generally afforded,* must proceed from its being less expensive, grass at that season being of less value, and work not so much in request. A winter's run, viewed in this light, and dealt with accordingly, has generally a contrary effect. For, in the spring, when you expect a sound horse, you have perhaps a skin without the carcass; or should they be still together, with the vital spark remaining, it will be absolutely necessary to give a summer's run, in order to retrieve the animal from the gates of death. But I have frequently seen some horses of a hardy nature, when their situation was well sheltered, with a full bite of grass upon it all winter, come through in a better state; and to observe them running in the fields, you would think that they were literally fat, and dull from being in such an overloaded state; but when they come to be more minutely inspected in spring, their dulness is found to proceed from poverty, and the fat turns out to be a rough shaggy coat, covering a 'rickle of skin and bone.' When a horse is found to be in this state at the commencement of spring, little good can be expected from his services during that important season; and as grass is the most effectual food for recovering a winter-starved subject, consequently, a great part of the summer will be spent before the horse is either able to do a day's work, or can be exposed for sale. But the treatment during the winter's run, which a horse ought to have, will, I am convinced, turn out to a much better account. In order, therefore, to improve a horse by turning him out all winter, he ought to have a shed to go into at pleasure, and be regularly fed there with good hay morning and evening, or straw with a feed of broken oats per day; being likewise furnished with a regular supply of good water: in short, if the horse is intended for work in the spring, he must be fed in a similar manner as those in the stable, otherwise he cannot be expected to compete with them when put to work. Mr. Lawrence remarks, that "a winter's run at grass, from the astrictive effect of cold upon the animal fibre, is justly held the most natural and efficacious method of recovering the tone of the sinews in overworked horses." But I am very doubtful of its operating equally favourably upon a reduced carcass and broken constitution; two general attendants of an overwrought horse. For a horse, therefore, only in a reduced state from overworking, I would recommend a summer's run upon a good natural pasture; if allowed a feed of oats per day, so much the better; and when the sinews only are affected, a winter's run will be preferable, provided the requisite attention is afforded, as already described. But for one that has all the above-mentioned effects of over-working upon him, both a summer and winter's run will be requisite: the former will make up the reduced carcass and improve the constitution, so as to enable the animal to withstand the cold to which he may be exposed during the latter,[*] so requisite for recovering the tone of the sinew. Such experiments, however, ought only to be tried when a horse has youth on his side, as old horses seldom or never recover.

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* It is too common for the horse intended to receive a winter's run, to be turned out, when grass has lost all nourishment, to shift for himself; and in a very severe storm, or when the ground is covered with snow, a little straw or spoiled hay is given to keep in the life, no shelter or covering being allowed or thought necessary, as many will tell you that the more they are exposed the better. Thus the animal is, as it were, hungered, to improve the frame or constitution, and bathed on the back and kidneys by repeated falls of rain and snow, to strengthen the sinews of the leg.

WOUNDS AND BRUISES.

Besides the numerous diseases to which horses are liable, they are exposed to many accidents, from whence are occasioned wounds and bruises upon various parts of the body requiring somewhat different treatment, about which it would be endless for me to attempt entering into minute particulars: I shall, therefore, confine my present remarks to the most suitable treatment for wounds and bruises in general. In cases of slight incisions, keeping clean and free from air will most frequently be found sufficient; but this must likewise extend to wounds of every description, in order not to retard their healing. When the incision is of the above description, but of some considerable extent, first draw the lips of the wound as closely together as possible,[†] and anoint it with "white lead and oil of turpentine, incorporated together with a little brandy;" or "apply upon the mouth of the wound a little lint or tow soaked in the tincture of benzoin," properly secured with a bandage, which may be taken off once a day, and either of the above applied. Should the cut swell much, the stitches may be slackened a little without taking out the threads, and foment. (See *recipe*, p. 40.) But should the wound be ragged and deep, first wash with milk and water lukewarm, and cut off all the ragged parts with a sharp knife or scissars; then fill the orifice with lint or tow dipped in digestive ointment. (See *recipe*, p. 34.) If the inflammation is very great, foment as already described, and apply poultices; and should the wound indicate mortification either after the above treatment, or from neglect at first, sprinkle finely powdered nitre over it, both inside and out, which, if not found effectual, anoint with oil of vitriol, and after the application of either, dress with digestive ointment; proud flesh must be removed with burnt allum and red precipitate in fine powder. In case of hemorrhage from a divided artery, endeavour to secure it with a waxed thread, by passing a crooked needle below it; but should this not be practicable, cover the bleeding orifice with a little lint dipped in the styptic, p. 40, keeping it fast upon it until an eschar is formed, and then proceed as already directed, only, allowing the first dressing to remain for two days before it is taken off, provided the bleeding is stopped.* When the skin is not broken in wounds and bruises, all that is generally necessary is to bathe with camphorated spirits of wine; but when the part affected is much swollen, and becomes inflamed, it is then necessary to make a slight incision below the swelling,† in order to promote suppuration. The orifice must be bandaged up, with a little of the following salve applied as a plaster:—"Frankincense and Venice turpentine, of each one ounce; Burgundy pitch, two ounces; gradually incorporated over a slow fire." When the wound begins to discharge matter freely, it may be dealt with according to circumstances, as already pointed out. If a bruise is of some considerable extent, blood must be taken immediately from some vein as near the seat of complaint as possible; and when the bruise is general over the whole body, the bleeding may be performed upon the usual place, and rather unsparingly.

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[*] I have repeatedly and successfully tried to improve the contracted sinew by turning out in winter, and invariably found a severe frosty dry winter to be the most efficacious.

[†] The lips of slight wounds may be sufficiently drawn together by proper bandaging; but when not sufficient, stitch it together with a flat crooked needle and waxed thread, or strings of white leather: every stitch may be about an inch asunder, unconnected with each other, and tied in a looseable knot, with a thread of such a length as will admit of being slackened in case of much swelling. When the wound is upon prominent or fleshy parts, the stitches should not be made tight, nor an attempt made in closing the lips too much, otherwise the animal, when lying down or rising, will tear them out.

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* Filling a fresh wound with salt, and bandaging it tightly up, is commonly used as a styptic, and will in general be found effectual. Bruised stinging nettles are sometimes mixed with the salt.

† It frequently happens that the swelling cannot be completely reduced without an incision being made, as above described; and hence is occasioned many a blemish unaccounted for.

I have now delivered my faint ideas on such diseases as I conceive may most commonly prevail among that species of horses to which I have here turned my attention; quoted as much from other writers as has tickled my fancy, and the limits of this work would admit; and selected some of the most simple recipes which I know, from experience, to have proven efficacious. And although what I have stated cannot be edifying to a veterinarian, or prove at all satisfactory to one wishing to acquire a thorough knowledge of farriery, yet I trust that as many useful hints have been given as will prevent the necessity of my readers (if possessed of an ordinary stock of cart horses and hackneys) running to the doctor and druggist on every trifling occasion. This expectation is founded upon my having reduced most of what I have stated to practice, for upwards of ten years, upon my own stock of horses; which generally consisted of eight draught horses, three or four hackneys, and four or five young colts; and on having, during that period, not called assistance above two or three times; and had no cause to regret not doing so, except once or twice, of which I have already taken notice.

SECTION VI.

REMARKS TO PURCHASERS.

I CANNOT conclude this chapter without offering a few hints to the inexperienced farmer or grazier, in order that he may, when he intends to purchase a horse, be upon his guard as to the deception of artificial life, created by whipcord and ginger, and other methods of disguising blemishes or defects so much and unwarrantably practised by the *jockeys* of the present day, who boast of the neatness and dexterous manner in which they execute them, the advantages derived therefrom, and the success lately met with, by falling in with '*greenhorns*,' who have so voluptuously swallowed their poisonous baits. In addition to the shapes and properties (recommended in the introductory view of this chapter) which a horse ought to possess, it is likewise wished and expected, by one who pays a fair market-price for a horse represented as young, healthy,* sound, and free from tricks and blemishes, that he really is so. I shall therefore endeavour to make a few useful remarks, to assist in judging whether or not a horse is as above specified. The proper time to judge most correctly of the whole of these perfections, would be in the morning, when the horse is standing quietly in the stable,† before he has been out, having had severe exercise the day before. If the horse belongs to a *jockey*, ask him no questions, and lend a deaf ear to every thing which he may say; as any thing in the shape of truth seems to be quite foreign to the profession. Request of him, however, that neither the whip nor ginger be applied as assistants in showing the horse, and that you are to be allowed to examine him without his assistance, except putting him to such paces as you may direct. The *jockey* will most readily agree to the above requests; but such regulations will be no sooner complied with than infringed by either himself or some of his attendants, who will sharply correct the horse, with the whip or a loud angry tone of voice, for some pretended misdemeanour, or perhaps ride him out of your sight, and then waken him with the whip and ginger, and return to you clapping and stroking the horse's neck, as if pacifying an animal of much pluck, life, or natural spirit.

But artificial life is likewise created by signs with the whip or waving of the arm behind your back, while you are examining the horse, or your attention is directed some other way: the master's pretending to scold the groom in a loud manner, for not allowing the horse to stand quietly until you examine him, has also the desired effect.* The more that such manœuvres as these are persisted in, or the horse prevented from standing a moment in one position, the more you must be upon your guard; for, be assured that there is some defect to be concealed. Allowing that you have so desirable an opportunity of examining the horse as that which I have pointed out, first go into the stable quietly, and watch the animal when standing undisturbed in the stall; and if he is tender in the fore legs or feet, or has any other defects in them, he will either be 'nuckling' occasionally at the knee or pastern-joints, or he will be standing with his fore feet extended, resting on them alternately, with his joints cracking as he makes the change. Defects in the hind legs may be discovered in a similar manner. Examine him minutely in the stable, by comparing his legs and joints with each other, and see that there is no symptom upon the knees of ever having been down,† no puffed up or blown sinew, ring-bones, curbs, spavins, splints, &c. which may all be easily distinguished when the sight and feeling are minutely and keenly applied. The horse may then be led out of the stable in a careless manner, at halter's length; so that, should there be any defect in his sight, some symptoms may be shown by his running against the wall or door in going out, or by a start or unusual stare immediately on approaching the light. The sight may be farther proven by waving the hand gently at the eye without touching it: if the horse does not shrink by shutting his eyelids, in all likelihood he is blind; but if he stares when the waving is made, or starts at objects of a trifling nature, or such as ought to be quite familiar to him, his sight in this case may only be defective.

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* A staring coat and heavy languid appearance are the most general and striking marks of bad health, which, connected with the symptoms of each disease already noticed, will greatly assist the purchaser in judging whether or not a horse is thriving and free from disease.

† But as so favourable an opportunity (as above described) may not always occur, particularly in a market, let the examination be as quiet and retired as possible; which is generally best accomplished by riding the horse out of the market, and allowing him to be composed, and rest occasionally upon his legs, as if he were in the stable.

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* The horse, from regular trainings to dread the whip and fear the voice, (as is practised by most horse-dealers,) will become all alive from even seeing the one or hearing the other.

† It must, however, be remembered, that there are other symptoms of a horse's coming down beside the hair of the knee being ruffled, or the skin cut; for I have frequently rode horses that had a constant practice of falling, and had neither marks of the one nor the other; which arises from the head's taking the ground first, and thereby saving the knees: in short, there are two kinds of tumbling horses, one that falls upon his knees, and another that falls upon his face. I would therefore suspect a horse as much for tumbling that has a broken face, (such as the nose and eyebrows,) as I would one with broken knees. But horse-dealers are apt to cover such marks with some colouring similar to the surrounding hair; and when the marks cannot be hid, they will endeavour to convince you that it was done by mere accident, either by leaping a stone dyke, or tumbling over a precipice; or if the marks are scratches on the face, that they were done by rubbing in the stall.

His age may be known, as directed in the table of the Introduction. But the *jockey's* modes of deception are likewise here introduced (from renewing the horse's age, as they term it) by making artificial marks* in the teeth of such as may have lost 'mark of mouth,' and passing them for six or seven years old. Such artificial marks are, however, easily distinguished, notwithstanding all the efforts of deception; for the iron used in making the marks leaves a yellowish circle round them, which is a good object of distinction from the natural mark, which has no such circle round it. The further ingenuity and intrigue of the *jockey*, however, too frequently succeed in disguising these marks of distinction, so as to prevent detection, by rubbing the interior of the horse's mouth with salt, and making it foam by violent agitation, so that the froth thereby accumulated may cover the unwelcome circle or seat of discovery. The soundness of the wind may be tried by squeezing the windpipe hard at the joining of the neck and head, so as to make the horse cough: should coughing be immediately followed by sneezing, it will indicate that he is sound in the wind: but if there be no sneezing, the symptoms described in page 53, for broken wind, will generally follow.

Having thus examined the horse minutely as to blemishes, sight, age, and soundness of wind, he may first be walked, and then trotted gently forward. You must stand immediately behind him as he goes away, and directly before him while he returns, so that you may see if he goes fairly upon his legs; that is, neither throwing them out at a side, nor crossing or touching each other.† If the horse is intended for the saddle, he may be put to all the different paces, both slowly and smartly, and a side view taken of him while performing them, to observe that he points his feet straight; sets them down freely; lifts them quickly, and high enough,[*] so as to clear all ordinary-sized stones that may come in his way; that he bends his knee well, and keeps his haunches below him, neither leaving his hind legs as if he were going to lose them, nor bringing his hind feet forward in such a manner as to strike or touch his fore legs or feet;[†] the former being apt to bring down the horse, while the latter will soon make him leg-weary.

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* The above marks are made by hollowing the middle of the teeth with an instrument, then filling the holes with rosin, &c., and burning it in with the end of a hot wire; which operation is repeated until the holes have a durable black appearance, resembling the natural marks.

† The touching may be more easily distinguished by examining the inside of the legs or joints between the legs and pasterns, where the skin or hair

The saddle horse must, however, be still further tried by mounting him yourself, which will be even a more certain mode of discovering the soundness of "lith, limb, wind, and eyesight," as well as the ease and rate in which he performs his paces.

First, ride him with a slack rein up and down hill, upon a rough road at a walk and careless slow trot: if he do these safely and pleasantly, you may then almost rely on his sight being good, and on his being a sure traveller. Next, give him a smart ride at all his paces, until he is a little warm, and dismount immediately, observing if he blows regularly without coughing, and stands firmly on his legs without resting them alternately, or shaking. Let him then stand until he cools, and mount him again. If he go off freely without stiffness or halt, he may be pronounced with some degree of safety to be sound.

As to the tricks or bad habits which a horse may have, they may be discovered, if a draught horse, by putting him into a cart, leading him loosely up and down hill both with and without a load, and frequently turning him quickly round, and making him go backwards with the cart. But if a saddle horse, should he have any bad tricks, he

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will be cut, if the horse has a habit of going too near. But while this evil is guarded against, let it be remembered that a horse which goes too wide should likewise be rejected; for extremes in either case are equally bad.

[*] A horse cannot go too low, provided he goes safely; for the one that moves in the other extreme soon tires both himself and rider, without making much progress in his journey.

[†] The above is most frequently done when going at a quick pace: hence it is called the 'speedy cut,' which is a very great objection to a horse.

will in all probability show some symptoms of them during such a trial as above recommended, particularly when there is a stranger upon his back. But should restiveness be apprehended from his looking back before he is mounted, and afterwards throwing back his ears and shaking his head in a sulky manner, ride him a good deal back and forward, particularly in a direction contrary to that to which he seems most inclined, giving him occasionally both whip and spur: such irritating manœuvres will soon make him appear in his true colours.

CHAPTER II.

NEAT CATTLE.

SECTION I.

INTRODUCTORY REMARKS.

THE variety of this species of domestic animal being so numerous, it would swell this volume beyond its intended length, to enter into the minutiæ of all the particular advantages and disadvantages of which each kind may be possessed. It would, however, be leaving the young or inexperienced grazier too much in the dark, to say nothing of them at all, particularly should he not have perused the different works on this subject.[*] Having therefore, in the course of this treatise, to recommend some crossing of the different species, by way of improvement, as well as to point out the kind best adapted for various soils and climates, it behoves me to say at least as much about each kind (which has already come under general observation) as to make my reader know each distinctively at first sight, and draw inferences as to the propriety of following up some remarks which I intend to suggest. This I have endeavoured to do in as concise a manner as possible, in the following table and annexed remarks. Although there

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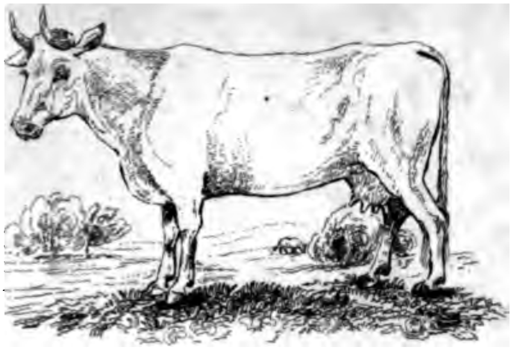
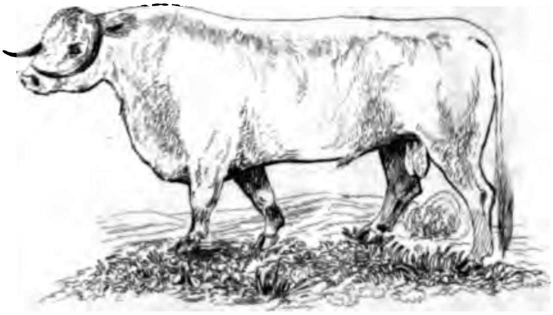
[*] Culley on *Live Stock*. *Complete Grazier*. Parkinson on *Live Stock*, &c.

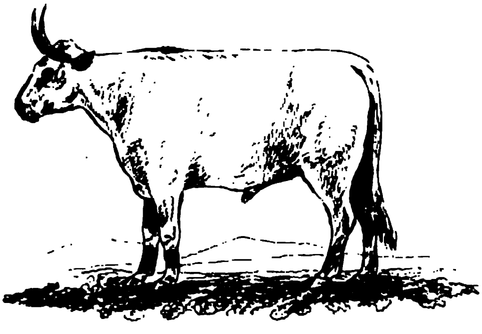
PLATE III.



Wild Breed



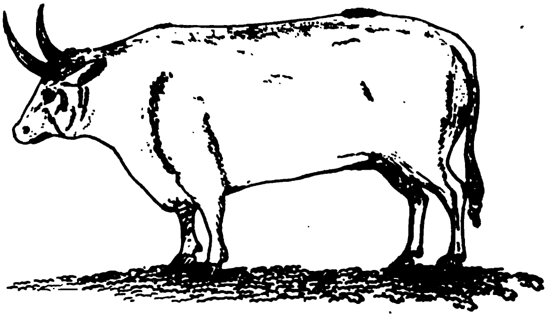
Lancashire or Long-horned Breed



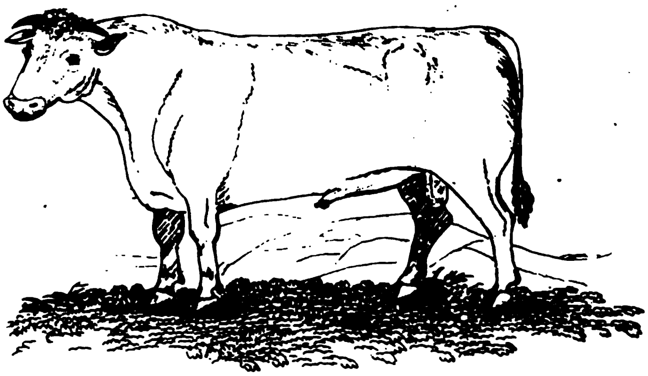
Devonshire Breed

W. H. Lizars Sc.

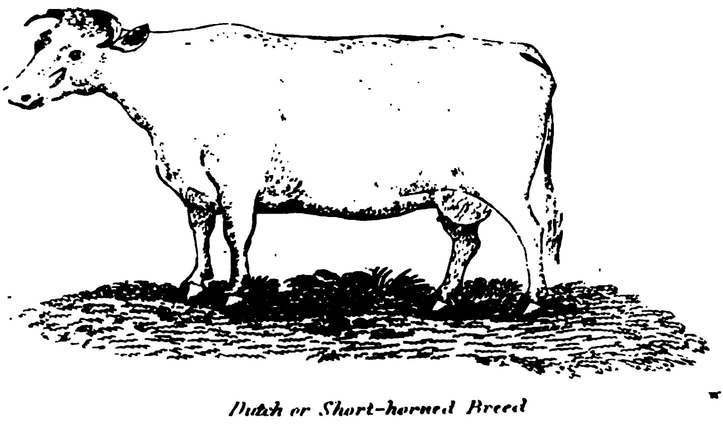
PLATE IV.



Hereford and Sussex Breed

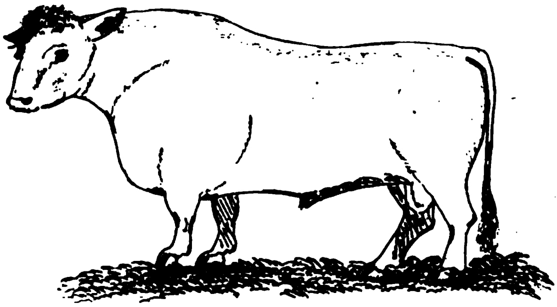


Dutch or Short-horned Breed

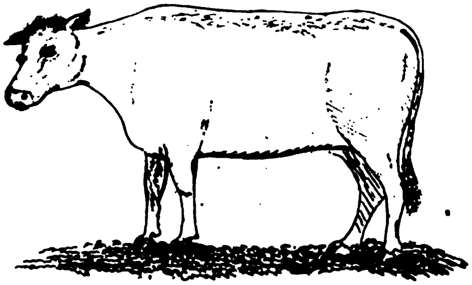


Dutch or Short-horned Breed

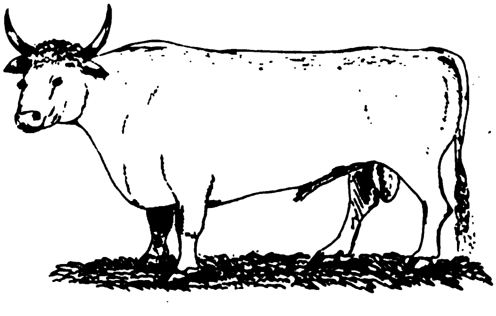
PLATE V.



Galloway or Polled Breed

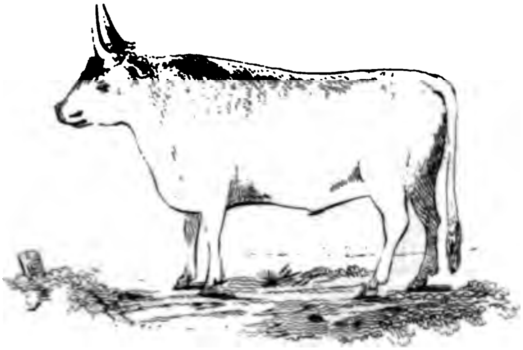


Galloway or Polled Breed

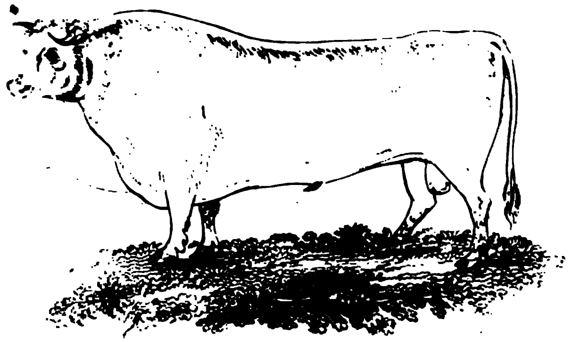


Argyleshire Breed

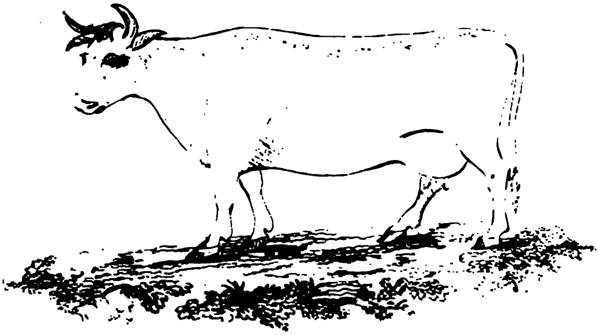
W. H. Lizars sc



Highland or Kyloe Breed



Ayrshire Breed



Ayrshire Breed

W H Lizars sc

may be some of my readers so ignorant as scarcely to know the difference of one animal of this species from another, and not able to place them, as it were, at their proper homes; yet I think there can be none so ignorant as to dispute the usefulness of those animals, when viewing the indispensable necessity of having plenty of beef, milk, hides, tallow, and even horns, for the use of mankind. Being therefore in possession of animals so valuable, it is certainly a duty incumbent upon at least part of the community, to aspire at something like perfection in the management of them; which has of late years, in several parts of the kingdom, been strenuously attended to. Yet I am sorry to observe that such a spirit has not become more general, and much surprised that it has not found its way into some districts of Scotland, where the particular interests of each individual are so closely and deeply involved.

Synopsis of the different Breeds of Neat Cattle in Great Britain.

REED.	CHARACTERISTIC MARKS.				PECULIAR ADVANTAGES OR DISADVANTAGES.					WHERE TO BE FOUND.
	Horns.	*Colour.*	*Skin.*	*Size and Shape.*	*Milk.*	*Quality of Beef, and average weight.*	*Fatten.*	*Constitution.*	*Pasture answerable.*	
Wild race..........	White, tipped with black, bent upwards.	White, tip of the ears red, muzzle black.	Thin, closely set, with long hair.	Middle size, well proportioned.	Little.	Well marbled and good flavour, 30 stone.	Slowly.	Hardy.	Coarse herbage.	Chillingham-Park, Northumberland.
Devonshire........	Medium length, bent upwards.	Light red, with a light dun muzzle, and ring round the eye.	Thin, silky handle.	Middle size, fine bone, short carcass.	Not famed.	Rather coarse, from 40 to 50 stone.	Rather quickly, and at an early age.	Do.	Medium quality, short.	Devonshire.
Herefordshire.....	Do. do.	Red, with white faces.	Thin, and fine hair.	Large, small bone.	Medium quantity, very rich.	Do. 50 to 70 stone.	Do. do.	Do.	Good quality, full bite.	Herefordshire.
Sussex..............	Do. do.	Do. do.	Do. do.	Do. do.	Do. do.	Do. do.	Do. do.	Do.	Do. do.	Sussex and Kent.
Dutch, or Short-horned..........	Short, turned in at the points.	Red and white nearly equally mixed.	Very thin, little hair.	Square made, and very large.	Large quantity, not rich.	Coarse, 80 stone.	Quickly, early age, much tallow.	Delicate.	Do. do.	Eastern counties of England, and some of those in Scotland.
Lancashire, or Long-horned...	Very long, frequently bending downwards.	Various, with white backs.	Thick, closely set with long hair.	Medium size, long and coarse.	Small quantity, very rich.	Do. 40 to 50 stone.	Slowly.	Hardy.	Coarse quality, full bite.	Lancashire, Leicestershire, Warwickshire, &c.
Dishley, or New Leicester	Long.	Do. do.	Rather thin.	Middle size, fine bone, and handsome.	Small quantity.	Medium, do.	Quickly, little tallow.	Ordinary.	Medium, do.	Leicestershire, and various counties in England.
Galloway	None, but sometimes small pieces of horn attached to the skin.	Various, but chiefly black and brindled.	Rather thick, closely set with long hair.	Medium size, well shaped.	Medium quantity, very rich.	Fine and well marbled, 35 to 40st.	Quickly, upon the best parts.	Hardy.	Medium quality, short.	Galloway and Dumfries-shire.
Suffolk Duns.....	Do. do.	Light dun.	Thinner than the Galloways.	Medium size, not handsome.	Much famed for quantity and quality.	Medium, do.	Do. do.	Ordinary.	Do. do.	Suffolk and Norfolk.
Highland, or Kyloes................	Medium size, bent upwards.	Black, some brindled and dun.	Thick, closely set with long hair.	Small, well proportioned.	Small quantity, very rich.	Fine, well marbled, superior to all others, 20 to 30 stone.	Quickly, and tallow well.	Very hardy.	Coarse quality, either long or short.	Highlands, or western parts of Scotland.
Alderney, or French	Short, smooth, and neat.	Light red or yellow.	Very thin, with little hair.	Small, fine boned, not handsome.	Much famed for rich quality.	Fine and well flavoured, 25 to 30 stone.	Quickly, and make very fat.	Very delicate.	Fine quality, full bite.	South of England, mostly in the possession of landholders.
Ayrshire	Small, of various forms.	Pied or sandy red.	Do. do.	Small, not very handsome.	Famed for quantity and quality.	Medium, 25 to 30 stone.	Rather quickly.	Rather delicate.	Medium quality, rather short.	Ayrshire.
Welsh	Long and thick, bent up.	Chiefly black.	Rather thick.	Small, well proportioned.	Small quantity, and rich.	Fine, well flavoured, 20 to 40 stone.	Quickly.	Very hardy.	Coarse quality, either long or short.	Wales, and the south of England.
Irish..................	Long, thick, in various forms, but sometimes polled.	Various, generally white backs.	Thick, closely set with long hair.	Various sizes, long bodies and coarse necks.	Medium quantity, very rich.	Coarse, from 25 to 50 stone, or 80 stone.	Slowly.	Hardy.	Coarse quality, full bite.	Ireland.
Fifeshire	Small, white, bent upwards.	Various, but chiefly black.	Rather thin, silky handle.	Large and handsome, rather leggy.	Large quantity, rich quality.	Fine, 40 to 70 stone.	Quickly.	Hardy.	Medium quality, either long or short.	Fifeshire, and the adjoining counties.

NOTE.—The breeds connected together by braces, in the first column of the above Table, are species of the same kind. The average weight specified, is when the ox has arrived at full perfection, and thoroughly fat, allowing 14lbs. to the stone. The characteristic marks, advantages, or disadvantages, above specified, may in some instances differ, particularly in the size, shape, and quantity of milk and beef; these being so liable to change from advantages or disadvantages during the period of rearing. Although I have, in the above Table, pointed out the kind of cattle best adapted for different kinds of pasture, yet I trust it is not understood, that it is meant that the pastures are best adapted for the cattle, or intended that they should be invariably grazed upon them, as this must be regulated by the constitution, connected with climate and

Additional Remarks to those given in the preceding Table, arranged as in the first Column.

WILD RACE.

The remarks already made, relative to this breed of cattle, seem, when taken collectively, to be descriptive of quick feeders; yet such cattle are well known not to possess that quality. This, however, may be partly, if not wholly owing to their undomesticated state, which makes them so easily alarmed and disturbed when grazing, and to the immoderate and reducing exercise that is caused by the slightest alarm. This breed is now rarely to be met with, and is only kept in some gentlemen's parks as a curiosity; and from theit untameable nature, and improbability of keeping them anywhere but in walled parks, or by high impenetrable fences, it is not very probable that they will ever get into repute for use. Indeed the general management, requisite for rendering them at all useful or profitable, would be too tedious and expensive ever to bring them into competition with the domesticated kind in point of profit. I have seen a cross breed between them and the Highland cattle, which had a very handsome appearance, though not remarkable for any particularly good property, and still retained a great proportion of the original wildness.

DEVONSHIRE BREED.

This breed is said to be descended from the wild race, and those are only considered of a pure kind which answer to the colour described in the table. They have a striking appearance, although not particularly handsome, being rather leggy, and flat in their sides. They are thin faced, fine in the chops, and wide in the hips, with a small tail set on very high. Being hardy and quick in their movements, they are particularly well adapted for draught; and from their arriving at maturity sooner than most other breeds, they feed at an earlier age, and of course give a quicker return; which circumstances render them an animal particularly claiming the attention of a grazier possessed of a small capital and high-rented land.

HEREFORD AND SUSSEX BREEDS.

These breeds, being only a variety of the Devonshire, are much similar, and the advantages resulting from them nearly the same; but the Herefords are considerably the largest, some of them when aged and fat having been known to weigh 100 stone. This breed is described by Mr. Culley's friend, Mr. Ellman, as rather defective in shapes, particularly in the chine's being narrow, and the sides too flat; but I cannot say that these defects have struck me as being peculiar to this breed. On the contrary, I have frequently admired them in Smithfield market, both in point of symmetry and small bone, and for carrying a greater proportion of beef than most of the different kinds of large oxen shown in that market. From their being much larger than the Devonshire breed, they require better keep, and are not so active in the yoke, although much famed in that respect.

DUTCH, OR SHORT-HORNED BREED.

This breed was originally imported from the Continent, as is evident from their retaining the name of *Dutch*, and cattle of the same description being of a long standing, and still reared in Holland. Where climate and soil are adapted to their constitution, and market suitable, they are undoubtedly the most profitable kind that is to be met with; at least they possess more good qualities than any that I have yet seen or heard of, viz. producing most beef,* tallow, and milk. From their kindly disposition to fatten, they may be fed off to great advantage even when three years old; which I have frequently seen accomplished, and sold at from £18 to £20 each: or they will improve until seven years old, and the additional weight which they gain during the last four years, will pay in proportion to the second and third years;† which is owing to their continued great growth; for any animal, when at full growth and thoroughly fat, ceases to pay ever afterwards. The number of stalls which the cows of this breed occupy in most of the large dairies in London and other parts, are a proof of their superiority in milking.[*] The beef of the aged short-horned ox, when fully fat, from its thickness, retains the juices longer, and consequently keeps longer in pickle than most other beef; hence it is peculiarly adapted for long voyages. But since the consumption for the navy is at present so much diminished, I should think a much readier market would be found for this breed of cattle when three or four years old, as their beef is then of a much finer quality than when aged, it being then quite strong and rancid. It must therefore be of great advantage to be in possession of such a breed of cattle, which will feed off at almost any age, as situation or other circumstances may require. But however partial I may be to this breed, yet I am convinced that nothing less than a good climate, with a full bite of a superior quality easily procured, will make them realise the expectation of the feeder or grazier.

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* There have been instances of some six years old oxen of the short-horned breed weighing upwards of 150 st. (14lbs. to the stone.) See Culley's *Observations on Live Stock*, p. 48.

† I mention the second and third years, on account of my having invariably found from observation and experience, that no breed whatever pays in

LANCASHIRE, OR LONG-HORNED BREED.

Cattle of this breed are further distinguishable by their long carcasses and coarse bull-like appearance. They weigh well in proportion to their size; and although the cows do not yield much to the pail, yet from the superior quality of their milk, they are in great repute in most of the cheese-dairies in Cheshire, Gloucestershire, &c. The original breed is very coarse, and more of the lyery[†] or black-flesh-

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proportion to what it does the first year, particularly if near a good veal-market, or where there is a regular demand for year-olds.

[*] Instances have been known of short-horned cows giving each upwards of 16 Scotch pints per day during the summer months, and yielding from 3½ to 4 firkins of butter during the season; but the average may be estimated at 12 pints of milk and 3 firkins of butter: and to substantiate this, will require both grass and dairymaids of a superior quality and description.

[†] Lyer, or black flesh, is a dark coarse-grained beef, with no mixture of fat, resembling horse flesh. Cattle of this description are generally known by the round plump appearance of their hind quarters, which, if accompanied with a feel or touch of one's finger, as if on a board, is a sure symptom of this invaluable kind of animal.

ed kind are to be found among them than among any other breed. It is fortunaté, however, that the original breed is now nearly extirpated, and in various places replaced by a species of a far superior quality, known by the name of Dishley, New Leicester, or Rollrights. But notwithstanding that the original breed of cattle alluded to have many bad qualities, yet they are not destitute of all good ones; for, from their thick coverings, they are particularly hardy, and well calculated for wintering in fields with straw or hay, &c. or in open sheds; which is of great consequence where there is a deficiency of house-room. They are, further, well adapted for grazing in wet climates or exposed situations, especially if the land produces strong coarse grass, and not so consumable by smaller cattle, which may be found equally hardy in constitution, although not so powerful in digestion.

DISHLEY, OR NEW LEICESTER BREED.

This breed, as I have already hinted, is an improved species of the Lancashire or long-horned kind, the specific characters of which nearly correspond with the parent race, although differing very materially in other respects, viz. by fattening much quicker upon less food, and taking the fat on upon the most valuable parts. They are much famed for getting fat in a short period, and at an early age; heifers at three years of age, and bullocks at four. From the thinness of their skins, they are not so hardy as the branch from which they sprung: consequently, they require food of a superior quality, and to breathe in a more temperate atmosphere. The public are indebted to the late Mr. Bakewell of Dishley for the first selection and improvement of this valuable breed; also to Mr. Fowler of Little Rollright, who has brought them to great perfection. Hence arises the name of Dishley, or Rollright breed.

To show the perfection to which the aforesaid gentlemen brought this breed, and the estimation in which they were held by breeders in the counties where they were known, Mr. Culley gives the following account of Mr. Fowler's sale, 27th March, 1791:—

“ Garrick,	a 5-years old bull,	sold for	205 guineas.
Sultan,	2 do.	do.	210
Washington,	2 do.	do.	205
Young Sultan,	1 do.	do.	200
	1 do.	do.	145
	1 do.	do.	100
Brindled Beauty, a cow,		. .	260
Washington's mother,		do. .	185”
“ At Mr. Paget's sale, 14th Nov. 1793, Shakespear, a bull, bred by Mr. Fowler, was sold for		. . .	400

In the spring of 1792, Mr. Bakewell let a bull for 152 guineas, to be only used four months.”

Mr. Parkinson, in his *Treatise on Live Stock*, when describing this breed, says—“ Mr. Princep now excels every breeder yet recorded, as he has been bid 500 guineas for a two-year old bull, and thirty guineas a cow for the use of his best bull to fifty cows.”

GALLOWAY, OR POLLED BREED.

These cattle derive their name from the district of Galloway, where the pure original breed is to be found. They are likewise kept throughout Dumfries-shire, although not of such genuine stamp as those in Galloway, owing to the farmers making milk their object, and selling their rearings mostly when one year old: consequently, they do not mind what the cow is, provided she milks well, and produces a calf dark in the colour, resembling the Galloway breed; and to endeavour to insure the latter, they pay particular attention to procuring dark-coloured Galloway bulls,[*] knowing that stirks of this tinge will bring from five to ten shillings per head more in a market than those of a light cast, although equal in size and condition. But I am persuaded that if such breeders had to depend upon feeding off their rearings at four or five years of age, (to pay their rents, &c.) they would soon discover that something more was essential than having their stock merely resembling the Galloway cattle in colour. I am sorry to remark that this custom prevails too much even in Galloway, where one might expect to find the breed unpolluted; for I have frequently seen Irish cows among some good stocks in Galloway, so much alike, as to require a pretty accurate judge to make the discovery. This inattention to purity is easily accounted for, the Galloway breeders having only to produce a good dark-coloured three or four years old bullock or heifer in good condition, to insure them generally of a quick or ready sale either at home or at Dumfries market, where they make a point of getting clear of their stock, in some way or other, to cattle-dealers who take them off to England, and dispose of them to the graziers. By this means the breeder seldom or never hears how his cattle have turned out, and I suppose he considers it foreign to his business to make any further inquiry about them. If the cattle-dealer produce in the English market a good Galloway-like beast to please the merchant, he, on obtaining a reasonable profit, thinks that he has discharged his duty with regard to the management of his department in life: hence it rests with the English grazier to discover the difference between the Galloway and Galloway-like cattle, which he frequently does not to his profit, and without being able to trace the genuine cause. The pure Galloway has a straight back, is rather long in the body, and upon the whole a handsome animal, possessing several particular and decided advantages over most others, being almost equally adapted to all the different variations of soil and climate in great Britain. From their hardy constitution, they can be reared upon poor soil, in cold wet climates; and when removed to richer pastures and warmer climates, they have been long found to answer both the expectation of the grazier and butcher, and are at this period highly esteemed by both; and their beef is so much so by the consumer, as generally to bring in Smithfield market one penny per pound more than any other kind exposed there for sale, the Highlander only excepted. This fact I have frequently witnessed, and have had it repeatedly verified in selling lean stock in various markets throughout England. In short, I do not hesitate to assert, that there is less risk in removing this breed to different climates or situations than most others, as they seem to be equally well adapted to heat and cold, and while they will readily get fat (upon the best parts) upon good or middling pastures, they will also thrive and do well upon bad ones.

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[*] Black and dark-brindled are the favourite colours.

Before concluding the description of this breed of cattle, I cannot avoid expressing my astonishment at finding three eminent writers* all to agree in stating that the Galloway cattle resemble the long-horned both in shape and colour; which they certainly do, in some degree, in the former, their shape being long in proportion to their size; but in the latter there is no resemblance whatever, the long-horned being generally of a red and white colour, with white backs, while the Galloways are chiefly black or dark-brindled, with their backs of the same colour. The writers above alluded to could not have committed a greater mistake as to colour. I do not apprehend, however, that the mistake lies in the colour, but in taking one animal for another,† viz. the Galloway-like for the Galloway; for let me tell those gentlemen that, among the large quantities of polled cattle that go from Scotland to supply the English markets, (principally those of Norfolk and Suffolk,) one third of them are a cross between the Lancashire, or Irish, and Galloways; which induces me to give the following account how this practice has become so general. In the district of Galloway, most of the graziers are in the habit of selling a certain number of three or four year-olds annually; and those who keep forty cows, wish at least to sell that number of young cattle of the above ages: but from various causes, frequently only thirty-five calves are reared from those cows, and in some fatal seasons not more than thirty. Such a deficiency is therefore to be made up from some quarter, and their neighbours being similarly situated, they are obliged to have récourse to Dumfries market; and when such a deficiency becomes general throughout so large a district, the number wanted will be something very considerable, and therefore cannot be made so select, particularly as to colour. But in addition to the above, most of the farms in Galloway are better adapted for rearing cattle than being fully stocked with cows: consequently, some graziers who keep only twenty cows will perhaps sell forty or fifty three or four years old cattle annually, and will therefore have to purchase a number every year to keep up the stock, having likewise recourse to the market already mentioned. The purchasers must therefore content themselves with such a description of cattle as that market will afford; which are chiefly composed of the Dumfries-shire produce (already described) and stot-stirks from the county of Cumberland. The latter are a cross between the Galloway cows and the long-horned bulls,* and are bought by the Annandale jobbers at Carlisle market on Saturday, and sold at Dumfries market on Wednesday following, whence they return with Galloway heifers to Carlisle next Saturday, making two sales in the week during summer and autumn. Those jobbers always endeavour to have the lot for Dumfries market dark in the colour, and all polled; which is not so easily accomplished, on account of the stock exposed at Carlisle market being generally white-backed and horned. But they readily remedy the latter evil by cutting the horns off their heads, and likewise manufacture Irish cattle into Galloway ones in the same manner:† hence arise the white-backed Galloways resembling the long-horned cattle in shape and colour, described by the aforesaid gentlemen; which proves their remarks to be in some degree correct, notwithstanding their not seeming to be aware that the cattle alluded to are either branches from another root, or adulterated ones of the same tree.

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* Mr. Culley and Mr. Parkinson *on Live Stock*, and the compiler of *The Complete Grazier*.

† The above mistake frequently occurs in various parts of both England and Scotland (where the pure Galloways are not known) much to the injury of the reputation of that breed, from the *apparent* Galloways not proving to have those superior qualities which the genuine breed is represented to have, and actually does possess. This mistake generally occurs (and has the same effect) with the Ayrshire breed of cattle.

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* The above cross originates from Galloway cows being kept partially in Cumberland, in consequence of being better adapted for the commons or poor lands in that county than the native breed.

† The method of transforming cattle, as above, is a very cruel operation, and gives the animal great pain. It is executed in the following manner: The horns are sawn off close to the head with a small hand-saw; the wounds are then seared with a redhot iron to stop the bleeding, and afterwards covered with tar, and some of the hair of the animal put upon it for a further deception. I have known several cattle die in consequence of this operation, when performed during the warm months of summer; having been struck with the fly, and not perceived in time, the maggots grew and penetrated the head, which caused almost instant death. Cattle having had the above operation performed upon them are easily distinguished by a squareness upon the crown of the head, which the natural polled cattle do not possess.

SUFFOLK DUNS.

This breed resembles the Galloways so much almost in every respect as scarcely to admit of a doubt of their being descended from them. This conjecture is the more probable from the long intercourse that has subsisted between the Scotch drovers and the Norfolk and Suffolk graziers. They are inferior to the Galloways with respect to shape and constitution; but the cows are superior for the dairy. From their flat ribs and large bellies, they appear to be much shorter in the legs than what they really are; and like most great milkers, they are generally lean, and, upon the whole, have rather an ugly appearance, although a most valuable sort, fattening kindly, and not to be rivalled in yielding to the pail from inferior pastures.* The system generally practised among the dairy-keepers in Suffolk, although not to be admired, is deserving of notice. They tie up their cows in the fields, without any shed to cover them, in the following manner: A temporary crib is formed along some hedge, with posts about three feet asunder, to which the cows are tied. They are regularly bedded with straw, and the dung is piled up behind them, forming a wall, which, together with the shelter of the hedge and warmth created from the bodies of the cows, is found sufficient without any covering. This either indicates a hardy constitution or a very superior climate; but I am inclined to think that it is a little of both united. It is, however, a practice not to be attempted in most climates, and too slovenly, I hope, ever to become general, even where circumstances would admit of it.

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* The general calculation of the Norfolk and Suffolk dairies is, that each cow, upon an average, will give twenty-two quarts per day, and yield three firkins of butter during the season.

HIGHLANDERS, OR KYLOES.

This breed of cattle derives the former name from being a native of the Highlands of Scotland, Highland cattle in general being so called; and the latter is applied to such of them as have crossed the *kyles* or ferries in the Highlands: but in some parts of England it is likewise used as a general name for those cattle. They are of various colours; but those most in repute, and esteemed for being most hardy and genuine, are black, or dark-brindled, or dark dun. In point of advantageous properties this breed very much resembles the Galloways, but is more hardy, being smaller, and reared in general upon worse land, and a much colder climate. They fatten quickly when put on good pastures, yield a greater proportion of tallow to the size of the carcass than any other breed, and the quality of the beef is infinitely superior. But the beef of the Galloway and Fifeshire competes very much with theirs in Smithfield market; and although I cannot say that there is much difference in the price per pound, yet I know that a decided preference is given by connoisseurs to the latter. The weight of this breed varies very materially (like most other Scotch cattle) according to the districts in which they are reared, or the ages at which they are sent off to the English market;* for if at three and four years of age, which is generally the case, they are then pretty near their full growth, and when put upon good land on their arrival in England, they instantly take to fattening; but if by chance they leave home when two or nearly three years old, and are grazed two years upon even some of the inferior pastures in England, it is astonishing how they stretch out. I have seen some, in this case, feed to fifty stone (fourteen pounds to the stone): but Mr. Culley quotes an instance of a kyloe bred in Cantyre,† fed by Mr. Spearman of Rothley-Park, Northumberland, and killed 22d July,

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* The average weight of five years old bullocks, in some particular stocks in the west Highlands, may be estimated at from thirty to thirty-five stone (fourteen pounds to the stone); and some singular ones will weigh forty stone and upwards.

† See Culley *on Live Stock*, p. 68.

1790, which weighed upwards of eighty-one stone net, and above a hundred stone gross weight. It is, however, very much to be doubted that this animal was a true Highlander; indeed it is pretty evident that it was not; for the Cantyre cattle,* in general, have merely a very faint resemblance to the original breed of Highlanders. I have seen most of the stocks in that district, and very few of them indeed can claim any pretensions to the true Highland blood, although no doubt a cross pretty far removed; for milk being more the object in that quarter than rearing, low country cows of various kinds, and Irish, have been introduced for sake of that commodity alone. But notwithstanding Mr. Culley may be correct in calling the animal above alluded to a kyloe, (which he evidently means to be a true Highlander,) yet I think that authors, when treating of any distinct breed, before quoting particular instances of any description, ought to be pretty certain that such animal or animals are genuine; otherwise it only tends to mislead the reader by deviating from the true qualities which each kind spoken of may actually possess. The Highlander I consider to be one of the most useful and indispensable breeds that is to be met with; for I should like to know where a substitute could be found for some of the wet, cold, and barren tracts in the Highlands generally allotted to them; or where would one be found for turning the refuse of some of the improved breeds in England to so good an account? From their kindly disposition to fatten, they are generally first brought into market in the spring, when grass-fed beef is scarce, and consequently high in price. But the most essential advantage attached to the Highland breed is, that they will become fat in some situations where most kinds would merely subsist, and others starve; and although they may justly be deemed an inferior class of milkers where the climate or pasture is at all tolerable, yet in such situations as above alluded to, they will even outstrip most other breeds during a season's milking. Still I think there are few situations even in some of the most barren parts in the Highlands, where two or three superior milch cows[*] might not be introduced to advantage for the supply of a family. It is however a fact clearly ascertained, that the quantity of milk which the Highland cows give is almost invariably rich, indeed more so than that of most others: but this may proceed partly from their being principally grazed upon natural pastures, most of which are well known to produce much richer milk and better flavoured butter than the artificial ones. I am, however, sorry to conclude, (the Highlander being a favourite of mine,) that the great deficiency in quantity of milk will ever prevent the Highlander from being a competitor for the dairy; and my experience on this head forbids me at present to recommend the experiment. There are varieties of this breed, which, like most others, vary in constitution, quality, and appearance, according to the mode of treatment and climate in which they are reared. For example, the Argyleshire cattle, which I conceive to be the heaviest and handsomest of the true species, are very hardy; yet the Isle of Sky breed are still more so from being farther north, while the Orkney and Shetland 'bog-trotters'[†] in point of hardiness, excel the whole of this and every other species of neat cattle. The Isle of Sky breed are allowed by some writers to be the quickest feeders of the Highland race;[‡] but whether such writers have gained their information on this head from experience either of themselves or others, or from the general rule that the smallest animals are the quickest feeders, I cannot say: but if from the latter, they ought to have instanced the Shetland and Orkney in place of the Isle of Sky breed; and if from the former, I think that the mistake or deception may be accounted for in the following manner:

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* The Cantyre cattle appear to resemble the Fifeshire, or rather the Aberdeenshire cattle, some being horned and others polled, of various colours, and evidently a cross, although no particular one. But as I consider them to be an adulterated race, I shall take no farther notice of them, than strongly recommending to farmers of that district to extirpate them as quickly as possible; for if they have even one good property, it seems quite imperceptible, and I am persuaded that none will keep them, if once judiciously and impartially compared with the superior qualities possessed by some of the other breeds of which I have taken notice.

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[*] Of the kind of cows above alluded to, I shall have occasion to take notice in a subsequent part of this treatise.

[†] Bog-trotters is a term used in some parts of England for the smallest Highland cattle.

[‡] See *Complete Grazier*, p. vi; and Potts's *British Farmer's Cyclopaedia*, article Synopsis.

I am well aware that the Isle of Sky cows are very justly in great repute among the graziers in England, from their kindliness to fatten; for experience has taught them that when those cows are immediately put to fatten, on their arrival in England, along with some of their fellow-travellers, (which perhaps have not been so far north,) they are in general much sooner ready for the butcher. But this is not to be wondered at; for the Isle of Sky cattle seldom leave the place of their nativity until their growth is nearly completed, while the others leave it in the middle of their growth, or at least before they are at maturity: consequently, when the two classes arrive at their new and final abodes, the one immediately commences taking on beef, while the other continues to stretch in carcass. But were the cattle above alluded to both put to feeding with equal advantages, I am decidedly of opinion, that although the difference of time in being fat might not be great, yet it would be in favour of the southwest Highlander: for it may be observed, that the farther north the Highlander is, its skin is thicker, and adheres more closely to the flesh; which consequently renders it slower in fattening, otherwise the criterion, so strongly adhered to by most of the English graziers in the choice of cattle, will not hold good, viz. preferring the silky loose-handling skin to the hard, dry, and firm one.*

FIFESHIRE BREED.

These cattle have evidently descended from the Highland breed, by having undergone various and repeated crosses with animals of a larger stamp; and from their present appearance, the conjecture is probable, that they contain a considerable portion of the English long-horn blood, which is said to have been conveyed by an English princess (Margaret, the wife of James IV.) when she went to Falkland in the county of Fife,* which was that sovereign's favourite residence. Those cattle are well proportioned, and small of the bone in proportion to their size, which varies much; but if proper attention is paid to rearing, they will compete with most of the improved English breeds even in point of weight, and as to quality they are already so far superior as not to admit of comparison; which, together with their aptitude to fatten, make them in great repute among the graziers in England, whither vast numbers are taken annually for sale: and while they are highly esteemed by both the fattening grazier and butcher, they are equally so by the dairy farmer.† In short, this breed perhaps possesses more desirable and generally more suitable qualities than most of those yet spoken of, having united with a quick disposition to fatten, (and that upon the choice parts,) a large quantity of beef of a superior quality, with comparatively little weight of bone. They are likewise capable of being fed at almost any period after three years of age, and have a hardy constitution suitable for most pastures and climates. There is a species of this stock in Angus-shire, Aberdeenshire, and Banffshire, that are equal in repute to them, particularly the polled bullocks or runts,‡ which in some parts of England are preferred from their want of horns,§ being thereby more suitable in places where they winter their stock running loose in open sheds; and such as have been in the habit of grazing the Galloway breed prefer them for their resemblance to that stock. But there is likewise a smaller breed in the above-mentioned shires, of an inferior cast, and which may justly be denominated an adulterated race of north Highlanders. They are known in Yorkshire and other parts of England by the name of the "Aberdeenshire slape skins." In the district of Buchan, comprehending part of Banffshire and part of the county of Aberdeen, the cows are much famed for the dairy. They are rather of a small size; and the best of them are such as are polled, and either of a black or brown colour. Their strong resemblance to the Galloway breed would indicate a near alliance to each other.

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* In Leicestershire, cattle are all chosen by the touch or feel. I have frequently been astonished when first attending markets in that county, with large lots of both Fifeshire and Irish bullocks, to see how the graziers would prefer some cattle considerably smaller than others; which, to a person accustomed to be satisfied with the eye alone, would appear to be some pounds less in value. But I generally found, (and not to my profit,) that before I disposed of my large *culls*, (a term used for the inferior part of stock,) there was more in the handling system than I was at first exactly aware of.

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* About the year 1503, being the time when the Queen left England.

† A good Fifeshire cow is said to give from 10 to 14 Scotch pints per day, and from 7 to 9lbs. of butter, and from 10 to 12 lbs. of cheese (tron weight) per week, for some months after calving: but I should not imagine this to be at all general, from any dairies that I have had an opportunity of inspecting.

‡ *Runts* is a name given to the Fifeshire, Angus-shire, and Aberdeenshire bullocks, by the Yorkshire jobbers, and is said to have originated from having been given to a coarse kind of short-horned bullock.

§ How so many of the cattle above mentioned come to be polled, I have not been yet able to ascertain; but I should suppose it must be owing principally to some of the Galloway breed having at some distant period been introduced among them, and the natives having become partial to those without horns, and consequently bestowed some pains in the selection of that kind of stock which might otherwise have now been entirely extirpated from the

WELSH BREED.

This breed resembles the north Highlander so much in every respect as almost to render a further description unnecessary. The horns are the most striking difference, curving more upwards, and being thicker than the Highlander's; but the specific characters in other respects, and peculiar properties, are nearly so much alike as to demonstrate them a branch of the same family, the resemblance being as striking as the two native languages are to a person understanding neither. Some of the cattle in Wales are susceptible of very great improvement, (particularly the Glamorganshire breed,) by proper selection and judicious crossing, and are greatly prized for their vigorous activity in the yoke. This breed bears a striking analogy to some of the Fifeshire cattle.

ALDERNEY OR FRENCH BREED.

This breed, as may be well supposed from the mildness of their native climate, are tender and delicate; on which account I should suppose they will never become general or useful in Britain. Indeed this circumstance is the less to be regretted, seeing that they do not possess any admi-

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above-mentioned counties, owing to the frequent intercourse with horned cattle.

rable quality, except the richness of their milk, which is far deficient in quantity, compared with most other kinds. But although the original breed may not answer in our climate, yet if the truth of the assertion made by several writers can be authenticated, viz. that the improved breed of Ayrshire dairy cows has some of the Alderney blood in them, it will be evident that this breed ought to be held in high estimation to cross from, particularly where the dairy is the object in pursuit. Although the external appearance of the Alderney cow is not by any means so prepossessing as to induce a breeder, who is partial to symmetry, to breed from her, yet she possesses a sufficiency of 'milking points' to induce the dairy farmer to try the experiment. There is a striking resemblance between the Alderney and Suffolk dun cow, particularly in the shape; and were I called upon to decide the origin of the latter, I should not hesitate to venture the conjecture of her being a cross between the former and the Galloway breed.

AYRSHIRE, CUNNINGHAM, OR DUNLOP BREED.

This breed of cattle derives their first or general name from being peculiar to the county of Ayr; but from the high character to which they have attained for the dairy, they are now become pretty general throughout the kingdom where that system is prosecuted. The name of Cunningham is attached more particularly to a superior selection of that species in the northern district of Ayrshire, known by that name, where the dairy has been a boast among the inhabitants for centuries. The name of Dunlop originated from John Dunlop of Dunlop, Esq. having (in the year 1750) introduced cows of a brown colour, and of a larger sort than the native breed at that period, by which he very much improved them. The present Ayrshire dairy breed is maintained by some to be a cross between the Fifeshire bulls and the Alderney cows,* while others allege that they are the descendants of a breed from Holland; and from a statement in Mr. William Aiton's very interesting and valuable Essay on the Dairy Husbandry,* it would appear that they are of English origin. But I am sorry to say that I have not been able, after repeated endeavours, to tracé a particular origin of the present highly esteemed Ayrshire dairy breed: indeed, from the various breeds, that I find have been in that country about the time of commencing the dairies with some spirit, and no particular breed having since been introduced and bred from alone, but merely crossing the old dairy breed† with various kinds of strangers, it is evident that any thing like the true pedigree would be almost untraceable. From the general appearance, however, of the present breed of cattle in Ayrshire, it is pretty clear that they have got a great portion of short-horned blood in their veins: but how this has been conveyed, I have not as yet been able exactly to ascertain, whether directly by the genuine breed, or indirectly by repeated crossing. But however various the conjectures may be concerning their true pedigree, yet I think it must be generally allowed, that they stand unrivalled in their celebrity for the dairy, particularly upon light soils.

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* See *Complete Grazier*, part vii; and Potts's *British Farmer's Cyclopaedia*, article Synopsis.

IRISH CATTLE.

This breed, being, in my opinion, merely an adulterated race of the Lancashire long-horned cattle,‡ might have been here overlooked: but as it may be considered proper, and of some service, when giving a description of animals, to take notice of the bad as well as the good, and from this species being peculiar to, and occupying such a large tract of country, it might be considered a great omission to neglect them altogether.

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* See *Farmer's Magazine* for 1812, No. XLIX. p. 54.

† The old dairy breed of Ayrshire cows seem to have been no particular kind, but a promiscuous collection from different quarters, taking a good dairy cow wherever she was to be found, without paying any attention to appearance or pedigree. About 60 years ago they were chiefly horned, and the prevailing colour was black, with a little white sometimes on the back, face, or flank; and here and there a brown cow was to be met with; which breed might very probably originate from a cross between the Galloway and Highlander, from Ayrshire being the seat of intercourse between these two districts. The average weight at that period [illegible], from 16 to about 20 stone, (14 lbs. to the stone,) the cows giving from two to three Scotch pints per day, while the present average weight is from 25 to about 30 stone, and milk from about nine to twelve Scotch pints.

‡ Mr. Culley supposes the Irish cattle to have some of the Welsh or Scotch blood in them, which I know to be partially so, although by no means general. See Culley *on Live Stock*, p. 90.

They resemble the parent race very much in appearance, being long in the body and level on the back: their skins are however thicker, and the hair more curled, and much slower feeders. They are particularly coarse in their head and neck, which prevails so much as almost to convince one that it is a fashionable propensity, the peculiar advantages of which have not yet been discovered; or the Irish breeders have rigidly adhered to Virgil's description of a cow most suitable for breeding bullocks for the plough, particularly where he states that he conceives it no great defect for a cow to resemble a bull in her countenance. The Irish cattle are principally red and white intermixed, with almost invariably white backs and long horns; but several black or dark coloured polled ones are to be found;* which, when brought to Dumfries market, are readily bought up by the Annandale jobbers, who soon convert them into Galloway cattle by mixing them with such lots, and passing their word and honour as to the purity of the whole; or, when the colour is suitable, but horns interfering, they have immediate recourse to the operation described in page 78.

This breed varies much in size,† like others already noticed, according to the soil and climate where it is reared; and although the cows are not noted for the dairy, yet good ones are to be found among them, both as to the quality and quantity of milk; but they are in general far deficient in the latter. When speaking of Irish cattle as a stock in general, they have nothing to recommend them, either from being best adapted for any particular portion of the globe, or from being a suitable subject to cross from. I have frequently observed in most of the markets in England where that stock is exposed for sale, that unless they were sold from a third to a fourth lower in price than most other cattle, they were invariably the last that were sold. But it is true that in time of war the large oxen of this breed were most readily sold, their beef being in great repute for the navy; indeed in those days there was a quick demand for all kinds of Irish cattle, but that was at a time when any thing with a head would have sold, even if the tail had been wanting. Great improvements have been made of late in Ireland upon their cattle, by crossing with long-horned bulls from Lancashire, Leicestershire, and various other parts. I have seen six years old bullocks so descended, of an immense size, and so fine in their heads, and in every other respect, as to have graced a park of some of the finest breeders in England.*

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* The above-mentioned kind I conceive to be a cross from the Galloway cattle, from their external appearance; which is very probable from the long intercourse that has been between the two places.

† It may be generally remarked, that cattle of the same breed, in the same county, vary as much in size as the land does in quality in that county; for instance, the large long-horned Irish oxen, reared upon the best land, will weigh from 80 to 100 stone (14lbs. to the stone); those reared upon the land of a medium quality, from 60 to 70 stone; and the small kind reared upon the inferior soil, from 30 to 40 stone.

It may be observed, from what I have stated relative to the general appearance of the various breeds of neat cattle noticed in the preceding pages,† that they vary very materially in point of shape; but as those which are considered most perfect in one breed resemble so much those of another, I apprehend that, in attempting to arrive at perfection in this particular, of whatever breed, one shape or form only is essential, which I shall endeavour to describe in both male and female.

BULL.

Head rather long, with a fine muzzle and crown; *eyes* prominent and lively; *ears* long and thin, with not much hair upon them; *horns* of a medium length,[*] rather small than thick, dark in the colour,[†] transparent and widely set upon the head, with a graceful curve upwards; *neck* proportionably long to the body, rising with a gentle curve from the shoulders until it joins the head, where it should be small and fine, having no loose skin hanging down, but gradually thicker until it joins the breast and shoulders; *shoulders* rather broad at the top, joining full to the chine, chest, and neck-vein; *breast* broad and projecting well before the legs; *arms* or *fore thighs*, and *buttock* or *hind thighs*[‡] fleshy and tapering to the knees and houghs; *legs* straight, clean, and small in proportion to the size of the carcass; *back* broad, straight and flat, with no hollow behind the top of the shoulder; *ribs* extending out from the chine, more circular than flat, rising one above another, so that the last may be rather the highest, leaving only a small space to the hooks, so as not to show a hollow there although the belly is empty; *hooks* or *hucks* widely set from each other, being round and standing a little higher than the ribs or rump, the latter of which being broad and nearly level with the back and ribs; *quarters* (from the hook bones to the extremity of the rump) long and tapering gradually backwards; *tail* set on high, being nearly in a straight line with the back, pretty thick where it joins the rump, tapering gradually downwards, and of a medium length, well haired at the extremity; *plates of the belly* strong, so as to prevent its falling below the level of the breast: in short, the carcass should have a deep, long and round barrel-like appearance,[§] (showing no hollows anywhere,) covered with a skin well haired, * mellow, and elastic to the touch. The head, horns, shanks, and all other offals or parts of little value, ought to be small in proportion to the size of the carcass. But although it is desirable to have a bull so fine in his shapes as everywhere to be free from coarseness, yet withal he ought to have a robust appearance, otherwise his stock is apt to be too small and delicate.

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* I was present with my father when he bought the bullocks above alluded to at Broughhill fair, at £16 apiece, and sold them at St. Faith's at £22 per head, at a period when cattle had met with a considerable reduction in price.

† I am well aware that I have omitted noticing various kinds of cattle both in England and Scotland which do possess several good properties; yet from their not having as it were formed a distinct race, but being partially found here, there, and everywhere, without any possibility of tracing the root from whence these good qualities spring, I therefore conceived the task to be endless, and not at all beneficial to the design of this treatise.

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[*] The length of the horns in any long-horned breed should bear some proportion to the size of the animal; and as to the length of those of the short-horned breed, it should likewise vary a little according to the size of the animal, still keeping in view that their horns are in general short and turned in at the points. But in such breeds as have no horns, (such as the Galloways, &c.) the head should contract gradually to a fine point at the crown.

[†] Although some breeds of cattle may be naturally white-horned, even then it is better that a dark transparent shade should appear.

[‡] Thick fleshy thighs are desirable in a fat animal; but when they are very thick and round in a lean one, they have a tendency to the lyer or black flesh. See note p. 73.

[§] A carcass deep, and not of the above appearance, is generally wider be- than above, and is consequently termed *gutty* or *baggy*; but the reverse

COW.

The shapes most approved of for a cow for fattening, or breeding stock for that purpose, are so very similar to those already described in a properly shaped bull, as almost to require no further remarks; only that robustness requisite in a bull may be here dispensed with. But when any thing like perfection is arrived at in either case, the only and most striking difference in point of shape is in the neck and head, as it seems not possible to reduce entire males of almost any description to that fineness and delicate appearance of those parts, which are to be found on well-bred females, or males castrated when young. But as the shapes of the best milch cows in general differ so materially from those with the quickest aptitude to fatten, a minute description of such shapes may therefore be necessary, in order more fully to comprehend what is implied in the most suitable shapes of a cow. One therefore intended for the dairy should be nearly as follows: *Head* small, thin, but rather long; *horns* small, and set on rather high on the crown; *neck* rather long, very thin, low, with no loose skin hanging down, and hollow from the crown of the head to the shoulders; (generally termed *ewe-necked;*) *shoulders* at the top and *breast* very narrow; *back* rather uneven and

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is the proper shape for carrying most weight upon the upper and most fleshy parts.

* Although much hair of a glossy and silky appearance is accounted a good quality for cattle in humid climates, and of some particular breeds, yet it does not hold good in all descriptions of cattle and climates; for the breeders of Scotch cattle, (particularly the Galloways and Highlanders,) will prefer the one with a shaggy mane, rough ears, and a bushy tail, while the breeders of the short-horned or some other improved English breed will reject such manes, ears, and tails, and tell you that the less hair the better, but particularly on the ears and tail, which indicates high breeding and quick feeding.

sharp, being hollow behind the shoulders, and little flesh along the chine; *rump* thin, with a declivity towards the tail, which should be small, with little hair upon it; *thighs* thin, and curving much at the houghs; (generally known by *sickle-hammed* or *houghed;*) *carcass* rather flat in the sides, light before and deep towards the hind quarters: in short, the general appearance of most good milch cows is, to the eye of a fattening grazier, ugly in the extreme, being not only free from flesh everywhere, but seemingly destitute of all aptitude to fatten. But although such shapes may very justly claim the downlook of a fattening grazier, yet they in general as justly claim the countenance of a dairy grazier, and upon the same principles become as beautiful in the eye of the one as they are ugly in that of the other. But although the above shapes are in general characteristic of good milkers, yet they are not invariably concomitant with them; for a cow may possess such shapes and not yield well to the pail, unless likewise possessed of the following indispensable requisites; viz. *udder* large and rather long, projecting well forward in the belly, and having an equal show before and behind;* which show must be composed of equal substance by feeling all alike, not in lumps; and which substance must, after milking, be apparently dissolved into a loose thin skin; *teats* should be placed at equal distances from each other, not being too close, and of a medium length and thickness, which ought to be equal, unless contracted a little at the extremities;† the *milk veins* should be large, particularly that which joins the navel. When these last particulars or requisites for a good milch cow are united with the most perfect points or shapes requisite for a fattening one, such an animal does not only give every satisfaction in milking, but equally so when put to fatten. It is, however, much to be regretted that such animals are not more numerous, and although I have great doubts as to raising a stock of cows which will yield fluently to the pail, and, at the same time, appear fat or inclined to fatten; yet by adhering minutely to the selecting of, and rearing from, the best milkers of such cows as do possess the fattening qualities, great improvement may still be made in producing a stock claiming the united praises of the dairy grazier, rearing grazier, fattener, and butcher.

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* A cow which shows most behind, and gives most milk from her hindmost teats, falls sooner off from milking than one which shows equally well before, and gives as much milk from the fore teats as the hind ones.

† If a cow's teats are broad at the extremities, the holes are generally large, and she is thereby more apt to lose her milk.

SECTION II.

ON THE SOIL AND CLIMATE BEST ADAPTED FOR EACH BREED, AND THE PURPOSES FOR WHICH THEY ARE MOST SUITABLE.

Having, in the beginning of this chapter, given such an introductory view of the different distinct breeds of neat cattle, (which have become of the greatest request, and are most generally known,) as, I trust, will enable the young or inexperienced grazier to draw some distinction as to the good and bad properties which each kind may separately possess; and before proceeding to illustrate the management requisite for neat cattle throughout all their various stages in life, and purposes for which they are intended, it may not be improper (indeed it is quite indispensable when treating of proper management) first to draw up a few general remarks upon the different kinds of cattle in connexion with the most useful purposes for which each seems to be peculiarly designed, and the soil and climate best adapted for them, when taking local advantages and disadvantages into account.

I shall first, for sake of illustration, consider Britain to be divided into three different climates, viz. good, medium, and cold and humid. The produce allotted for neat cattle in such climates, in order to consume it to the best advantage, will, according to circumstances, require either a dairy, rearing, running,* or fattening stock. First, supposing a dairy stock to be wanted, which, owing to situation, may consist of six different kinds of neat cattle; I shall, therefore, prefix to each situation such kind as I conceive to be most suitable, with reasons annexed for such an arrangement.

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* A running stock signifies that which is purchased for a time, but not made fat.

SITUATION.	BREED.
1. Soiling and selling milk new in the vicinity of towns,	Dutch, or Short-horned.
2. Rich pasture, good climate, - - -	Do. do.
3. Inferior, do. - - - - -	Suffolk Duns or Hereford.
4. Rich pasture, medium climate, - -	Ayrshire or Fifeshire.
5. Inferior or coarse, do. - - - - -	Galloway or Lancashire.
6. Best pasture, cold humid climate,[*] - -	A cross between the Galloway and Ayrshire.[†]

REASONS FOR THE PRECEDING ARRANGEMENT.

The preference is given to the short-horned breed for the soiling system, on account of their being heavy and inactive; consequently they receive most injury in collecting their food, and in travelling back and forward to their pasture; which is sometimes necessary: but I have principally preferred them on account of their giving a large quantity of milk; for, in such a situation, quantity is more the object than quality. They are however, still further, most suitable for such a system, from their constitution having been found from experience to be more congenial to stall-feeding and confinement than any other breed of cattle; which is consistent from their having such thin skins slightly covered with hair. But as the above objections against such cattle answering to graze in the fields can only be removed by a rich full bite in a fine climate, I have, in this instance, likewise given them the preference on account of the quantity of milk.[‡] In the third dairy situation I have recommended the Suffolk Duns or Herefords, the former, from their constitution being more hardy with respect to food than climate, and having already given unquestionable satisfaction in a good climate and inferior pasture; the latter, from having a similar constitution, but requiring better keep than the Suffolk Duns to do them ample justice: they ought, therefore, only to be substituted when the dairy is combined with rearing, feeding, or draught; for all of which the Herefords stand in high estimation. In the fourth dairy situation the improved Ayrshire breed ought evidently to have the preference, for one of the best of reasons, viz. that of having in a similar situation arisen to an unequalled degree of fame. But should circumstances require that the dairy should be connected with rearing or feeding, the Fifeshire cows ought to be substituted, but not otherwise. From the peculiar advantages and constitutions of these two breeds so nearly corresponding, and from their alleged affinity, there can be no doubt that the food and climate suitable for the one will be equally so for the other. In the fifth situation I have recommended either the Galloways or the Lancashire long-horned breed, from their constitutions being proof against occasional blasts, and congenial to coarse herbage. This is clearly demonstrated from the mode of wintering these cattle practised in their places of nativity.* If the dairy is unconnected with any other system except the vealing of calves, a preference is

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[*] I have here only taken notice of one situation, considering that only the best pastures are at all adapted for the dairy, and seldom then, if much exposed to the inclemency of the weather.

[†] I have recommended the above cross from having tried the experiment, which proved successful. although upon a limited scale; yet I have no doubt but that a further prosecution of it would be crowned with equal success. (See chapter on Crossing.)

[‡] It is generally held out that the short-horned cows give thin milk; which cannot be considered suitable for a dairy, particularly when butter and cheese are the object: but I think it must likewise be generally admitted that

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the quantity of butter or cheese made from a week's milking of two short-horned cows upon such a pasture as above recommended, which, at twenty-four quarts per day for each, will be 336 quarts, must be considerably more than that made from three Highlanders in the same time, and on the same pasture; which, allowing each cow to give ten quarts per day, will be 210 quarts. I take two cows of the one breed, and three of the other, considering it a just calculation in the consuming of food; hence the short-horned cow will excel all others for dairy purposes, upon the above-mentioned pasture, in proportion as her extra quantity of milk overbalances the deficiency of quality, and making a proportionable allowance for the consumption of food.

* It is common in Galloway for young cattle to be wintered in the fields upon rough pasture, with occasionally a little oat-straw, or coarse meadow hay, while the cows receive similar treatment, with the exception of being admitted into the house at night; and those supplying the family with milk, receiving hay of a superior quality, and now and then a few potatoes or turnips; and from such treatment we generally find, in the spring of the year, cattle both old and young in a healthy thriving state. In Lancashire it is

due to the latter; but when rearing or fattening is to be united, the former will, in most cases, be preferable.

The sixth and last dairy situation, specified in the preceding arrangement, is the most difficult to fill up, from not yet being in possession of a description of cattle at all likely to succeed in it. I have, however, attempted to supply this defect by recommending a cross between the Galloway and Ayrshire breed; which I have no doubt of succeeding in some of the valleys in the Highlands, although I am much afraid of their not proving hardy enough at first for the more exposed good pastures where local situation might render a dairy desirable: but the soil and climate would in a few years bring the offspring of this cross to a suitable constitution, and still retaining the milking qualities. The speculation is at least worthy of trial on a small scale. But as the object to be aimed at here is the uniting of a suitable quantity of milk with a suitable degree of hardiness for the situation, this may be said to be accomplished at once by a cross with the Ayrshire and Highland breed; but such a cross I should conceive to be very hazardous, from the latter possessing little or no milking quality; the offspring might sometimes take to the one side and sometimes to the other. It would therefore be more advisable and certain, where milk is the object, to have it on both sides; then it would be secured, to which ever side the cross might incline;* and patiently wait for time to inure the animal to the situation.

Second, Allowing that the stock wanted is for rearing alone, which, by taking (as in the case of the dairy) six different situations into consideration, will nearly include all those which are or ought to be appropriated for that particular

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allowed that their cattle thrive best out of doors; for which cause they frequently practise a similar method of wintering, by giving straw or meadow hay in the fields to the young stock, and allowing the cows to receive theirs in an open shed. Turnips are more frequently given to the young cattle in Lancashire than Galloway.

* Let it be observed that the cross ought to take place upon the land appropriated for the dairy, as cows thus reared have a double chance of succeeding to those even brought in stirks from another country; hence all dairy stocks should be bred and reared upon the farm on which the dairy is kept; or at least brought from similar situations, or from a worse to a better.

purpose; for in general the best pastures are not suitable for rearing cattle, being more of a fattening nature; besides, the rent of such lands most frequently rises in proportion to the quality, and therefore requires a much quicker return (particularly where there is no capital) than that usually given by rearing; consequently such pastures are in general very properly applied to fattening or the dairy. You have therefore the six remaining situations here annexed, with their respective stocks placed as it were at home.

SITUATION.	CLIMATE.	PASTURE.	BREED.
1.	Good.	Medium or coarse.	Short-horned, or improved long-horned.
2.	Do.	Bad.	Devon, Hereford, or some cross of a similar stamp.
3.	Medium.	Medium or coarse.	Galloway, Lancashire, or Fifeshire.
4.	Do.	Bad.	West Highlander or Welsh.
5.	Cold and humid.	Medium.*	Do.
6.	Do.	Bad.†	Small North Highlander.

REASONS FOR THE PRECEDING ARRANGEMENT.

In placing these different breeds of cattle in the several situations for which I consider them best adapted, size and constitution‡ were my principal guides; (as may be observed by examining the table of characteristic marks, page 70;) and upon the supposition that the bad pasture in the good climate was equal to the medium pasture in the medium climate, and that the bad pasture in the medium climate was equal to the medium pasture in the cold climate,§ I therefore arranged the different breeds accordingly, by placing the largest and most delicate animals in the best or equal pastures in the finest climates, and so on in proportion.] Thus, for example, the short-horned breed, being the largest size and most delicate, is entitled to the best pasture and climate: but although I have allowed equal pastures for the Herefords and Galloways, yet, owing to constitution, the Herefords are allowed the best climate; for although the pastures are equal, yet the climate will not admit of the stocks changing situations. In the preceding arrangement, a choice of different breeds of cattle is given, which the breeder must vary according to the custom or fashion of the place in which he lives.*

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* Should the situation be far north, the native breed will be found preferable to all others.

† In many situations of this kind, and even upon the bad pastures in all the different climates above mentioned, a sheep stock ought to be kept. See Management of Grazing Farms, chap. vi. sect. 11.

‡ In discovering the constitution of animals, it will be invariably found that judging from the skin and texture of the hair is the best criterion to go by, as it may be observed that a thick skin, closely set with rough hair, universally covers a hardy constitution, and the reverse a delicate one.

§ It is pretty evident, and must be generally admitted, that the colder the climate the coarser is the herbage, and consequently affords less nourishment.

Third, The next stock under consideration is a 'running' one. All kinds of cattle are more or less suitable for this system; but the heavy and delicate less so than others.† The same rule may here be observed as in the rearing system, both with respect to pasture and climate, always keeping the fashion of the market in view where you intend to dispose of the cattle. But as it most frequently happens that customers of different kinds are to be met with at almost every market, it may not be improper for the grazier of this description to have a variety of kinds; for he will often find in markets where he may attend to purchase, that one kind may be got at or below its value, while another sells much above it; besides, having different kinds, or at least different ages of the same kind, is quite indispensable in some situations, owing to the variety of pasture in the same farm, which may have in one corner a kind of grass that will be readily consumed by a Highland bullock and increase his growth, while a short-horned one would almost starve before he put his mouth upon it: or such grass may be very suitable for a three or four years old,* while it would be quite indigestible by a stirk or two years old of the same breed. However, there is one general rule to be observed, which is, always to purchase cattle from a climate and soil equal or even worse than the situation on which they are to be grazed, otherwise their growth will be checked before the constitution and taste are made pliable to it. This rule, although applicable to all systems of grazing, yet when not minutely attended to in this system, operates against it in a much greater proportion of loss than against any other; for, growth being here the principal dependence,† when it is checked, all hopes of gain may be lost; for although a rising market may sometimes help to close the breach, yet a falling one as frequently widens it. The case however is quite different both in a dairy stock and a fattening one; for in the former the change is not so frequent, and consequently time in a great measure removes the evil; and although it may for a time cause a cow to give less milk, yet she generally gives less or more to at least assist in paying her food; and in the latter the change may be said to be nine times in ten favourable, the grass allotted for fattening being most frequently of a superior quality to that generally allotted for other purposes. But when it happens to be unfavourable, it is to so slight a degree as soon to be recoverable; aged animals,‡ being more hardy, are not easily affected by change, and when they are, they sooner get the better of it.

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* A breeding grazier is more under the caprice of fashion than any other; for nothing but a constant study of what will best suit the market will insure success, always keeping in mind that the best article of the same kind generally brings the highest price.

† The large cattle, being mostly reared upon grass of a finer quality, acquire a more delicate taste; consequently have stronger powers of discriminating the different flavour of pastures: hence arises their aptness to reject that food which is not similar to what they have been accustomed to.

Fourth, The last stock to be noticed is the fattening one, which is necessarily composed of all breeds of neat cattle, that being the last allotted stage of their existence; but the particular kind most suitable for each situation which was laid aside for this purpose, (when treating of the rearing system,) must be partly regulated by the kind of beef most in demand at the nearest good market, however allowing all other circumstances to be favourable. I am persuaded that the following rule will generally hold good, viz. that a North Highlander will get fat upon the situation allotted for rearing the West Highlander in the medium climate; and that the West Highlander and Welsh breed will get fat on that specified for the rearing of the Galloway, Lancashire, and Fife cattle; which kinds will do in like manner upon the best pasture in the medium climate: the Devon and Hereford breeds upon that allotted for rearing the short-horned or improved long-horned cattle, which last remain to be fattened upon the best pasture in the finest climate,* and would require war to keep them and other breeds producing similar beef, in great request for the shambles: hence the present peace makes light carcasses, proportionably mixed with fat and lean, in the greatest repute; consequently the rage for breeding ought to take a turn, and instead of being for most beef from a given quantity of land or food, it should be for most of a certain *kind* from that given quantity.

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* The above must have been clearly demonstrated to those who have occupied such a rearing farm, by finding the necessity of making such divisions in it as separately to graze the cattle of different ages, by allowing the youngest always the most tender and delicate food.

† The improvement in condition of such a stock in some situations may be considered of equal advantage to that of growth; but when the latter is stopped from a change of food or climate, the former must be at least retarded for a time.

‡ Cattle put upon grass to fatten are generally arrived at maturity, or nearly so.

I have now endeavoured to make the young grazier as well acquainted with the different breeds of cattle, and situations in which each kind may be most advantageously placed, as I trust will greatly assist him in making a selection of such a kind or kinds as may be found most suitable for his intended system or respective situation in which he may be placed; yet I hope he does not consider these all the qualifications which a complete grazier ought to possess. They are certainly the first and most essential points; but if not connected with a thorough knowledge of management in all its departments, he might perhaps have been as near his purpose had he not known the difference between one kind of cattle and another, but just contented himself with the breed that might chance to have been upon his farm for centuries back, as they in all probability would answer better when left to their own management, than strangers from a distant country; for it is mostly by splitting on this rock that so much money is lost, and the various speculations on the introducing of new breeds are condemned.

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* I have tried the most of the above experiments, particularly with the Highlander, Galloway, and Lancashire breed: indeed it is quite common for north and west Highlanders to be fattened in Galloway, and several parts of Dumfries-shire, upon land similar to that allowed for rearing or putting the Galloways into tolerable condition. It is also equally common for Galloway, Lancashire, and sometimes the Fife cattle, to be fattened on the best pastures in Galloway, Dumfries-shire, and various parts in the borders of England; and the climate of such situations I should not conceive to be above mediocrity.

I have frequently seen (and been intimately acquainted with) graziers who have had large tracts of land covered with the ancient kind of stock of their forefathers; but owing to their not making an equal return to some of the improved breeds which they had perchance seen or heard of, therefore very properly set earnestly about effecting a change by extirpating the old stock at reduced prices, while they supplied their place at extravagant ones. This change, although not made in a judicious manner, might have even turned out very well; but having merely made the change, they thought nothing more was necessary but giving the new stock in charge of the servants, and telling them the wonderful profits that had arisen from such a breed, gave then full scope to their extravagant ideas in search of pleasure and amusement, thinking that the new stock would pay for all. But the servants, either for want of knowledge on the management of the new stock, or from being prejudiced against them, gave them similar treatment to the old native stock, which, from their progenitors having been left to their own shift for time immemorial, became so hardened and independent as to be proof against the indolence or ignorance of servants. But the new stock, not being accustomed to such neglect and treatment, fell off rapidly, until at length the grazier became almost, if not wholly ruined, and the breed utterly condemned.

To obviate such evils therefore, I shall proceed to explain, in as concise a manner as possible, the proper management of neat cattle, which ought sedulously to be pursued throughout all the various stages of life, comprised under the following heads, viz. breeding, rearing, and fattening; also explaining the symptoms and causes of the most prevalent diseases to which they are subject, with preventives and cures annexed. These, taken in the order in which they stand, shall comprise the remaining sections of this chapter.

SECTION III.

ON BREEDING.

Having, according to the instructions already given, selected males and females of suitable ages,[*] and best appropriated for the intended system and situation where it is to be prosecuted, the first thing to be observed is, to discover the most suitable time for the females to drop their calves; which must be regulated (when rearing is the object) according to the first commencement of the grass. This will vary a little, owing to soil and climate; but for example, let the month of April be the period, the males and females must then be put together for propagation in July, at which time both sexes ought to be in good condition, but not fat, otherwise there can be no dependence on having calves in a given month, or perhaps not at all; for cows in low condition are seldom or never inclined for the bull, while those in a very high state of condition continue to be too frequently so, even after repeated interviews.[†] But when a want of inclination on the part of the female in proper season does occur, either from poverty or otherwise, artificial means[‡] may be had recourse to, but never relied upon so as to prevent the breeder having his cows in good condition in the spring, being only applied to when accidental necessity calls for it. However, in order to ascertain the arrival of the expected offspring as near as possible, let the date of the last time which the cow cohabited with the bull be put down in a book kept for the purpose. Where the number of cows is great, it will be necessary to keep two bulls,* not only because one may be found insufficient for the number, but it most frequently happens that an aged bull requires the company of a younger one to make him do his duty; hence it will be of advantage to keep a young bull for bringing the cows in season in due time, while the aged one will perform most of the work. As soon as a cow has been observed to receive the bull, she ought to be immediately removed from the stock for a day or two, to prevent her from being tormented by the other cows, which frequently causes a second interview with the bull necessary. When the cows are all considered to be in a state of conception, or rather when the proper time for their being so is expired,† the bulls ought to be removed from them to prevent the accident of calves coming in an improper season; after which the cows must be treated with great care and tenderness, being neither subjected to the heavy blows of the dairy maid, nor the unnatural paces too frequently caused by the herd boy and dog. They ought to be provided with a due portion of healthy food, and on no account exposed to any offensive smell, such as putrescent carcasses,

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[*] See table, Introduction.

[†] When this is the case, in order to make her prove pregnant, and put a stop to her frequent inclination for the bull, the following drink must be given in a lukewarm state about two hours after the cow has received the bull: *Powdered alum, six ounces; Peruvian bark in powder, half an ounce; fresh powdered aniseeds, two ounces; and treacle, four table spoonfuls.* These ingredients must be mixed together, and a quart of boiling water poured upon them, then covered up until reduced to a lukewarm state. This drink will strengthen and brace the parts of generation; and if the cow is in a high state of condition, two quarts of blood may be taken from her. (See Clater's *Cattle Doctor*, p. 261, 262.

[‡] There are various recipes for making a cow take the bull, but I shall only here give two of the most simple, although equally effectual as any I am ac-

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quainted with. "Mix a small handful of spurge in some hay and give it to the cow to eat, and it will produce the desired effect in a few days:" or "give a quart of milk immediately drawn from a cow that is in season, before the bull has been admitted to her, and in three or four days it will have the desired effect."

* When two bulls are kept, they should be unequal in age and weight, to prevent their continuing to fight, otherwise they will fatigue themselves so much as not properly to accomplish the work for which they are designed. For the number of cows for each bull, see table, introductory chapter.

† The time in which a cow should prove in calf may vary according to circumstances; but when rearing is the object, in most situations the period ought not to be later than the end of July, otherwise the calf will be too late for gathering strength to support it through the winter; besides, early calves almost invariably make the best animals, and require much less pampering during the period of rearing.

&c.; if in the house, nothing but food of a sweet smell and flavour should be given them, not forgetting that most essential requisite, cleanliness, in every respect. Due attention being paid to such particulars, will prove a preventive to many premature births which so frequently happen quite unaccounted for; yet this malady will sometimes prevail in the face of the utmost care and attention: but as the cow inclined to slip her calf* most frequently evinces some symptoms of it by rejecting her food, and having a sickly appearance, and sometimes moaning, she ought, therefore, to be instantly removed to some distant apartment; for so great is the infection of this disease, that instances have been known of its going through a whole stock of cows, and even repeated the year following, as it is clearly ascertained that a cow slipping her calf once, cannot afterwards be depended upon, and therefore ought to be fattened, although ever such a favourite. I have recommended removing the cow evincing the above symptoms, more with a view to prevent the infection of others than to effect a cure,† which I have not yet been so fortunate as to accomplish, although I have frequently experienced the good effects of the precaution. But should such symptoms be overlooked, or perhaps never appear, and no discovery made until the cow has actually slipped her calf, she must even then be instantly removed, and the stall in which she stood completely cleaned, and a little quick lime strewed over it, and covered with clean straw: this will tend to qualify the infection.

In consequence of the abortion, it is frequently necessary to assist nature in removing the after-birth,* for which the following drink is frequently recommended: "Make about four quarts of water gruel, put it on the fire until it boil; then add one quart of ale, and one pound of treacle;" this mixture should be given when lukewarm, and the body afterwards regulated by giving brawn mashes for a few days.† The cow may have as much water as she will drink, lukewarm, with a little oat-meal strewed upon it; and as she begins to recover, must be exposed to the weather, and brought to her usual diet by degrees, and aferwards allowed to join the stock again; but a cow having met with this misfortune requires a great deal of nursing, and even then is generally long in recovering.

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* The most common time for a cow slipping or throwing her calf, is from the commencement of her pregnancy until the end of the fourth month; but Dr. Coventry states, "that fat females are most liable in the beginning and towards the termination, and the very thin ones about the middle period of pregnancy;" and Clater is of opinion that cows in the best state of condition are the most liable to this misfortune; and that towards the latter end of the year, while feeding on fog, or autumnal grass, or on low marshy and fenny grounds; while at other times it has proceeded from the smell of *carrion* exposed in the pasture, or too slightly covered with earth. (See Clater's *Cattle Doctor*, p. 250.)

† Cows in danger of slipping their calves should be taken from the pasture over night; and from two to three quarts of blood taken from each, and allowed to stand in an open shed all night, and the drink mentioned in note page 102, given next morning, and repeated in eight or ten days. (See Clater's *Cattle Doctor*, p. 260, 261.)

A few weeks prior to the calving season, the cows ought to be put upon better food, or rather upon food similar to that designed them after calving, as a sudden change of diet (which generally commences with the milking operation) is frequently attended with the worst consequences, this being a period in which such a change operates in a tenfold proportion to almost any other. Such mistaken kindness, which generally proceeds from a view of increasing the quantity of milk, sometimes acts contrarily by lessening it, and brings on such disorders as not only render the cow an unhealthy nurse, but terminate her existence at a very unprofitable and unseasonable period. A cow near the calving should have as much moderate exercise as possible;‡ and when standing constantly in the house, or when running at grass, if late in the season, and the weather very cold or wet, she ought, for some days prior to her bringing forth, to be put loose into a house of considerable space, (kept for natural births only,) moderately warm, but well aired, and bedded with short clean straw; she must then be examined late and early, so as to be caught in the act, and duly waited upon, to see if all goes on right, as it sometimes happens, from various causes,* that assistance is necessary. Should the calf present itself with the fore feet lying parallel to the sides of the head, and back upwards, assistance is then seldom necessary; but if otherwise, it is termed an unnatural position, and generally requires to be extracted in the most feeling and delicate manner possible. As, however, instructions given for such an operation would not be equally applicable in all cases, an expert cow doctor ought therefore to be employed; but when this is not convenient, the animal may be greatly assisted, and in most cases relieved in the following manner: Let a person with a small hand, well greased, endeavour to turn the calf into its natural position, by thrusting it back, as it were, into the womb; but failing this attempt, let each part of the calf be relieved as much as possible, as it comes forward, keeping it at the place, and always assisting the labour pains, by a little strength timeously given. Patient treatment of this kind seldom or never fails of success. After a painful operation of this nature, the pudendum generally swells, which ought to be regularly bathed with lukewarm milk and water; and the animal afterwards dealt with as has been already prescribed for one after a premature birth. After a cow has calved, it is a common practice instantly to remove the calf from her; this, however, ought not to be done until she has licked it almost dry, which she ought to be encouraged to do by shaking a little oat-meal and salt over the calf: this process has been found to be of infinite advantage for both parties, and is one of those particulars in which the dictates of nature seem to be indispensable. This being done, the calf may be removed to a distant apartment, and the navel string tied with a wax thread,* about an inch and a half from the body; then clip it off, about half an inch below the tying. The cow may now receive a drink of lukewarm water with a little oat-meal in it, not being too prematurely exposed to cold, if she has been accustomed to be in the house, nor kept too warm, if she has been much exposed to the atmosphere; but in one day or two be allowed her usual treatment. Where a number of cows are kept, and the calves fed by the hand, it is too common to mix all the milk intended for the calves; this is a matter of no consequence to those three or four days old; but such as are not, ought to have their own mother's milk at least for the first two or three days; it being then of a purging quality, will evacuate the intestines, which is at first so necessary for the future welfare of the young animals. These particulars having been attended to, the calf is now ready to be dealt with according to that mode of rearing which may be found most convenient and advantageous.

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* The removal of the after-birth (or cleaning as it is more frequently called) may be greatly assisted by encouraging the cow to drink, which causes an increase of urine; and the straining to avoid it tends to force the removal of the after-birth, to which, if not likely to come freely away, a light weight may be tied, and in very obstinate cases a gentle dose of salts may be given. The frequent practice of allowing cows with after-births hanging from them to mix with others, and permitting such to remain until they rot away, ought to be completely abandoned, as the putrid smell is frequently the cause of infection among other cows.

† A mash is prepared by taking a little wheat bran, and pouring as much boiling water upon it as to wet it all thoroughly, and allowed to stand until it become about lukewarm, when it ought to be given to the animal.

‡ As a proof of exercise being of advantage to a cow in the above state, see with what ease the cow delivers her calf, either when running in the fields, or when on a journey; but particularly the latter; the travelling loosens the bones, and causes the voiding of much excrement and urine, which greatly facilitates the delivery.

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* The most frequent cause of assistance is from the calf presenting itself in a wrong position; but it sometimes happens from too great a contrast being between the male and female; hence it ought to be studied as much as possible, in producing a new breed from crossing, (when a medium size is wanted,) to let the female be of the largest kind. (See chap. v. sect. 2d, on crossing.)

SECTION IV.

ON REARING.

Being now in possession of so useful a young animal, it behoves us to rear it in the most economical way possible, which can only be done by looking forward and seeing if the treatment which is intended for it during its calfhood will be beneficial to its growth and health afterwards; it is the erring in this particular where the first check of growth and hardiness is generally centred. For, shuting up a calf in a warm house, tied by the neck, where it is entirely secluded from light, air, and exercise, and fed with all the method and artificial food contrivable by our theoretical calculators on this head, certainly will not add to the future health, growth, and hardiness of an animal destined to so many changes and exposures of both soil and climate. Such treatment may answer to cover our tables with a lump of lifeless veal, while it will never cover our pastures with a stock at all calculated to turn its produce to the best advantage. I do not mean to insinuate that this mode of rearing is generally practised, or that it may in all the various particulars be fully acted up to anywhere; but that a near approach or resemblance to it has been, and is still practised among extensive rearers of stock, cannot be denied. It however may be said, that such treatment will answer in making a good stout calf, which in a little time will easily surmount all the evils above stated; but let it be remembered, that while it is thought that such disadvantages are daily overcoming, the calf is receiving an imperceptible check in both growth and symmetry, which neither time nor feeding can restore; for you see what it is, but you do not see what it might have been, except your discernment reach where it ought to do, in observing a striking difference, by comparing similar stocks in similar situations, receiving equal treatment, but which have been treated in almost direct opposition in their calfhood. Therefore, to guard against such present treatment as will be the foundation of future evils, let us look forward and regulate the treatment of the calf, so as to be most beneficial both in its present and after state of existence.

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* In tying the navel string, the thread should be passed several times round, not being so tightly drawn, nor the thread so thick as to cut it, otherwise an effusion of blood might be caused, difficult to stop, and likely to endanger the life of the animal.

The modes of rearing calves are almost as numerous as the kinds of food given them; and as they vary less or more in almost every county, it would therefore be an endless task here to insert the whole; but such as are most in repute may be confined to three, viz. never letting the calf suck its dam, suckling by regular meals, and suckling at pleasure; and the purposes for which it is afterwards destined are also three, viz. breeding, fattening, and labour. All the above modes of rearing may be equally suitable according to circumstances, but the latter is found to be infinitely superior in forming a healthy, hardy constitution. As to the purposes for which the calves are afterwards destined, there is no cause for distinction, the treatment necessary for each being the same; but as they advance in years, it may vary in some small particulars, which shall be noticed when treating of the different ages separately, after first discussing the three most prevalent modes of rearing calves.

1. NEVER SUCKLING.

This mode very improperly is sometimes a little connected with suckling, by allowing the calves to suck their dams for a week or two; but this is attended with two bad consequences, that of the calf being more difficult to teach to take its milk by the hand afterwards, and the cow seldom or never giving the whole of her milk to the dairy maid after once being accustomed to the calf: it would therefore be commendable either to suckle wholly or not at all. When it is advisable to bring up calves by the hand, on account of the demand or value of milk, the first thing necessary is to teach them to drink milk out of a kit; (which is now so generally known as to require no explanation;) this being done, give them as much milk new from the cow, three times a-day, (at equidistant periods,*) as they will take for the first three weeks, when they will gather such strength as to better enable them to undergo a slight change of diet. The exact quantity of milk being known which each has consumed upon an average at each meal for the last fortnight, give them the morning meal new from the cow, and the noon and evening meals half skimmed milk, (which must be sweet and not tainted) warmed to equal temperature with the milk when new-drawn from the cow; continue this for a week, and the week following let the morning meal be half skimmed half new, and the noon and evening meals all skimmed, with a handful of peas or barley meal mixed, but never on any account forgetting to warm the skimmed milk, as nothing is more injurious to a young calf's health than a cold drink. The calf being now five weeks old, (if not intended for breeding,) it may be castrated or spayed; but some prefer a greater age for the

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[*] Great regularity is requisite in feeding a calf, and whatever the times allotted are, they must be punctually attended to. If in summer, six o'clock in the morning, one p. m. and eight in the evening; but if early in the spring, seven in the morning, one p. m. and seven in the evening may answer, as stated periods for feeding.

latter operation, in order to assist the growth.[*] Having now attained a considerable degree of strength, it may be taught to eat hay, by placing a small bundle of the best flavoured and finest within its reach; linseed boiled to a jelly, or hay tea[†] mixed with a little milk, may now be given, say the sixth week, one meal of either per day, and the seventh two; and when eight weeks old it may be fed entirely upon hay and the above-mentioned jelly or tea. Thus having changed the diet by such regular gradations, will prevent that sudden change of the state of the body so injurious and fatal to calves. It must, however, be remembered, that the body must always be kept open, and in such a state as neither to be inclined to dysentery nor costiveness.[‡] Should the weather permit, and the pasture be good, the calf should now be taught to eat grass by letting it into a park a little every day; and when about three months old, it may be allowed to lie out night and day, and live solely upon grass, and a drink of whey or even water. I have not attempted to state particularly the exact quantity (as is generally done by most writers) of milk, or mixture which a calf ought to have at each meal, as this must vary according to the size or appetite of the animal, which I would invariably give as much as it would take, as it will seldom or never take more than what will do it good, particularly when fed three times a day, seeing that it possesess an advantage over some of our own species when drinking, viz. that of knowing when to stop. Among the numerous kinds of artificial food, and various ways of giving it to calves, so strongly recommended by gentlemen of eminence in various parts of the kingdom, several might be found much cheaper and more economical in the mean time than that which I have now pointed out; but I have frequently remarked that calves brought up with a less proportion of milk than that I have allowed, generally have a 'baggy' appearance, which neither indicates health nor growth; and it may be observed, that calves, when sucking their dams, have no such appearance unless the mother be deficient of milk: hence the nearer approach that hand-feeding comes to suckling, the more growthy and healthy will the calf be. It is a common practice to tie up calves to feed in the manner already treated of, which is by no means conducive to their future health and growth, as tied up calves fall off considerably more when turned to grass than those which have been allowed to run loose. It is therefore preferable to let calves run loose in an airy but moderately warm house well littered with clean straw, and having an open court or small field attached to it, so that therein they may be occasionally allowed to run when the weather is favourable; which, by their being thus gradually exposed to air and exercise, would not only assist their digestive organs and whet their appetites, but prepare them for the change of treatment which they are soon to receive.

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[*] I would prefer the above age to any other, seeing that there are not so many deaths occasioned at that time as at a more advanced stage of life; and I am fully convinced that, when performed by a neat operator, the health and growth will receive less injury at the above, than at a more advanced age. It might be here expected to explain the method of castrating and spaying, but the former is now so well known as not to require it, while the latter can only be learned by seeing it performed repeatedly. But for those who may not be yet acquainted with the method of castrating, I shall refer them to the explanation given on performing that operation upon lambs, chap. iii. sect. 3d, art. Rearing; which must be executed in a similar way upon calves, with the exception of allowing the calf to stand instead of holding it up, and pulling away the testicles with the hands instead of the teeth. This being the period for determining upon such calves as must be left entire, for the proper choice of them, and treatment, see *ibid.* what relates to tup lambs, which is here equally applicable.

[†] Hay tea, or infusion of hay, is made by filling a tub with the best flavoured hay, and pouring boiling water upon it until the tub is quite full; which being covered up for a few hours, will then be fit for use. It is advisable, however, never to make more at a time than what will be used in twenty-four hours.

[‡] See cathartics for calves, chap. ii. sect. 6.

The greatest evil which attends the above system is, that calves are apt to suck each other's ears at first, when fed with the hand, by which means they draw in much wind, and become hoven or blown up; and by such constant sucking, large balls of hair frequently accumulate in their stomachs, which completely put a check to their thriving. This evil, however, may be greatly remedied by teaching the calves to lick chalk or rock salt, which ought to be placed indiscriminately around the house; and being fond of salt, (which is so beneficial to their health) they soon prefer it to sucking one another's ears.

2. SUCKLING BY REGULAR MEALS.

This system I shall endeavour to show, is superior to any other. It is superior to hand-feeding in various ways, first, because it is much less trouble, and secondly, from the calves receiving their milk in a proper temperature of heat, they are consequently not so liable to disease. Hence they are more hardy, thrive better, and at last become better animals in every respect. It is likewise superior to the system of running constantly with the dam, for in this case, neither cow nor calf is so minutely looked after, sometimes the cow takes a sore udder or teats, either from being hurt with the calf or various other causes, which is not discovered perhaps until the cow is almost dry of milk and the calf half starved; but in suckling by regular meals, the cow is not disturbed from her food by the calf, her udder and teats are examined every milking; in short, if any thing is wrong with either cow or calf, it is noticed in due season, so that a cure may be effected before it is too late. All that is necessary in suckling by regular meals, is to be punctual to the time allotted for that purpose; first milking such a quantity of milk from the cow as she may be found to have over and above serving the calf,* which being done, the calf is put to the cow, (by some person employed for the purpose,) while the dairy maids continue to milk other cows in the same manner; and one maid going over all the cows after the calves seem to be satisfied, stripping† or milking any that may be left, which is so necessary to prevent the cows from falling off in their milk. When the calves are very young they should be kept in the house, and the cows brought to an adjoining byre or fold, when, after being milked by the maids and calves as above described, they should be sent back to their pasture again. This is generally performed twice a day, about six o'clock in the morning, and the same time in the evening; but I should prefer three times a day in summer, even although the cows were not very "deep of milk," for it is too long a fast for young calves to be fed only twice a day, particularly when they are not able to take any other food. After the calves are about five or six weeks old, they should be put into a good pasture well sheltered, and the cows brought to some adjoining field to be milked; and when the dairy maids and calves are both satisfied, the cows ought to be removed to some distant pasture, for when they are too near their calves, the cries of each disturb one another.* This system is, however, very often abused by encroachments upon the milk for the support of the family, which most frequently takes place from an increase of family caused by a demand of labourers for other farming operations; the dairy maid, from obeying her orders, robs the calves of their right, and thus while the wife is saving her husband one shilling within doors, she is losing him two without. Indeed the dairy maid should not be employed in most cases farther than putting the calf to and from its dam, and examining if it has taken all the milk; if not, she must milk the cow quite clean, observing that there is no defect about either cow or calf. This is in general all that is necessary in most of the breeding districts of Scotland, where it will seldom be found but that calves, when receiving justice, will be fully adequate for the consumption of all their mother's milk; and let the breeder keep in view, that while he so deprives his calves of justice, he is likewise depriving himself of that portion of it which mankind in general are so anxious should be so fully distributed to them: in short, calves deprived of a sufficiency of that fluid which nature has destined for them, deprives the breeder of his necessary reimbursement, the land, upon which they are afterwards grazed, of its character, and consequently will ultimately deprive the landlord (if the source from whence the evil springs is not discovered) of that rent to which his lands entitle him. But where milk is so indispensable as to cause such infringements upon the calves' right necessary, let as many cows of a proper milking kind be kept, as to be sufficient for the supply of the family in all cases; *this* will be the only preventive for the house-wife throwing away two shillings without doors, while she is attempting to save one within; and *this* alone will be found to suppress that jarring* of management between man and wife, and make their mutual interests go hand in hand with each other.

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* It is common, and particularly in the Highlands of Scotland, to allow the calf first to be satisfied, and then the dairy maid to take what may be left, which is often not much.

† The milk which is taken from a cow a few minutes after being milked, is called strippings, which is the richest of the milk.

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* It is customary in several parts of Scotland, but particularly in the district of Galloway and Dumfries-shire, to let the cow and calf run together, and to prevent the latter from sucking but at regular and stated times, a kind of muzzle is fixed upon the mouth, (so as not to impede its eating of grass,) with the upper part beset with pieces of sharp iron or wire, so that when the calf attempts to suck, it pricks the cow, which prevents her letting it, until the dairy maid removes the muzzle at her stated periods for milking. I have frequently seen the skin of a hedge-hog used as a substitute for the above description of muzzle. But this system is by no means advisable in large stocks, neither is it generally practised among them, for it frequently happens that dangerous wounds are inflicted upon the cows by such muzzles: it can therefore only be at all advisable where circumstances will not admit of the cow and calf being separated.

3. SUCKLING AT PLEASURE.

This mode of rearing calves is attended with much less trouble than any other, as they are allowed to run constantly with their dams until they wean themselves, which is generally about the time that the cows are near calving again: such extra indulgence in general makes a good stout healthy stirk, but is very injurious to the cow, and operates heavily against the following progeny. From the little trouble caused by this mode when compared with others, it is but too frequently adopted from the servants' recommendation, and the ready compliance of the masters with their selfish requests. It may however be very applicable in some situations where the pastures are mountainous and extensive, for in such situations the stock are often and necessarily in search of food widely dispersed, the collecting of which, even twice a day, would prove very injurious to them. It is in this particular only that this system may be said to be superior to the last mentioned one; but when from such circumstances, calves running at large with their dams may be advisable, I would recommend weaning them before the winter sets in, and have such kind of suitable food prepared for the calves, as might in a great measure compensate for that small portion of milk generally afforded them by their dams at that season, on which they commonly depend too much, which prevents them making the necessary search for, and application to such food as they might have in greater abundance; and although the quantity of milk be small, yet taking it from the cows until the spring, will prevent them from fattening so quickly, or from being such good nurses the following summer, according as to either of which purposes they may be destined. But it may be said, (and sometimes very justly,) that, in some situations, unless calves receive some nourishment from their dams during winter, they could not be supported or kept alive until spring, from no food being procurable of that nature calculated for the digestion or nourishment of so young and tender a constitution; but such a situation is one of those which I have in a subsequent chapter recommended to be stocked with sheep in preference to neat cattle.

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* It is common for farmers, in order to finish some piece of work in due season, to employ an extra number of workers, while they neglect to furnish their houses with an extra quantity of liquid; the wives, therefore, have no remedy but reluctantly to rob the calves, which being done, the husbands perceive a falling off of the stock, and as it were to make up all defects, attach all the blame to their wives, whereas if they would take an impartial view of the case, they would find that the fault originates with themselves.

TREATMENT TO FOLLOW ANY OF THE PRECEDING METHODS OF FEEDING CALVES.

Although situation and other circumstances may cause a little variation in the mode of rearing and time of weaning necessary, yet I think it will be found invariably of advantage to wean calves partly before going to grass, and entirely before leaving it; for when this is deferred until the grass is finished and the season cold, so that housing and recourse to a change of diet are necessary, the changes collectively are too much for the young constitution to bear, without being less or more productive of some bad effects. The time for housing must be regulated according to the falling off of grass and change of weather, and not the falling off of the stock, as is too frequently the case.* When this period has arrived, and been judiciously chosen, let the calves be put into a house moderately warm, well bedded and kept dry, having a free circulation of air and the finest of the winter food reserved for them, whether hay or straw, and given in racks put up in the house for that purpose. It will be found of great advantage to have an open court attached to the calf house, so that they may go out and in at pleasure,[*] exercise being so essential for digestion; they must be put out every day to water, but if allowed turnips as they ought, in moderate portions, they will partake very sparingly of that liquid, still they should have the offer of it; and if the winter is at all moderate, they ought to be allowed to remain in the fields a great part of the day and there receive their turnips. But as too many of these roots are found to be injurious to young cattle, and particularly so when they are inclined to get fat and full of blood, being then encouraging to that mortal disease known by the name of "black leg;"[†] great precaution is therefore necessary in the distribution of this food, always allowing a smaller portion to those most inclined to get fat; and as it is likewise necessary to be more attentive to the weaker part of a stock, by putting them in a separate apartment so as to prevent their being overawed, it will therefore be requisite when the stock is large, to divide them into three different parcels, viz. putting all those in high condition together, the small and weakly, and the strong but poor. Those in high condition to get very few, if any turnips, while the strong but poor lot may have a moderate quantity once a day, being always lessened as they get into better condition. The small and weakly lot ought to have the most nourishing particles of food selected for them, and not so many turnips given at first as the strong poor lot, but gradually increasing the quantity as they get stronger, and diminishing whenever there is a tendency to get fat or full of blood; for all that is necessary

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* Such a criterion for housing not only loses the effect of the summer feeding, but is the cause of double attention and extra feeding being necessary

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in winter, even to regain the condition lost, or check of growth produced from such an unwarrantable delay in the time of housing. See remarks upon housing young horses, (page 12) which are equally applicable in this case.

[*] See plan of office houses.

[†] The above-mentioned disease almost invariably attacks those fullest of flesh and blood.

is to keep young cattle in a thriving state without attempting the least to fatten. It is further necessary in the feeding of young stock, indeed any stock, to give them no more at one meal than what they will readily devour; but if, from the difference of the quality of food, or any other cause whatever, a certain quantity is left, let it be removed before a fresh supply is given, or rather as soon as the animal has left off eating it, for nothing is more injurious to the appetite than a quantity of food remaining constantly before the eye after it has once been satisfied.* Should the quantity of even the finest of the winter provender allotted for calves be rather unequal in quality, the coarse or inferior should be given them in the middle of winter; being neither fond of it immediately after leaving grass nor early in the spring.† The calves having been brought through the winter, great caution is necessary in putting them out to grass in the spring, (particularly if they be in low condition,) their stomachs being then too weak to stand luscious rich feeding; but letting them out a few hours every day will inure them to the grass by degrees, as they will, as the spring advances, get a fresh or a greater supply. Should the calves at this season have a tendency to rub themselves until they take off the hair, or show any other symptoms whatever of heat in the blood, a little blood should be taken from them, the quantity being regulated according to the state of the animal. They must be kept in the house for twelve hours after this operation is performed, during which period no cold water must be given.

Having now described the treatment necessary for calves from their first appearance until the subsequent spring, when they are twelve months old, and take the name of *stirks* or *year olds*, the most critical period of rearing may now be said to be over, particularly if the *stirks* are in a thriving state. However, the grass allotted for them the subsequent summer, should be of a fine quality, easily chewed and digested; a supply of good water being at all times and seasons necessary. The succeeding winter the stirks in some places receive the name of "six quarter olds;" when their treatment in every respect may be the same as that given them the first winter, excepting that the food may rather be of a coarser quality, and given in larger quantities,* and they may now either be wintered in an open shed with a court attached to it, or in a sheltered situation in the fields, with a shed to run into to take their food and remain all night; which must be regulated according to the cattle and climate. Indeed, when keeping this particular in view, and not forgetting that "cattle well summered are half wintered," and "well wintered half summered," the same process may be continued during summer, autumn, winter, and spring, until they have arrived at full growth; keeping in mind, that as they advance in years the food which they receive may be of a stronger and coarser nature, unless such cattle as are intended for the dairy, which should always be supplied (whether in summer or winter) with that kind of food most conducive to milk; viz. in the former season they should be grazed on fine old natural pastures, (the greater the proportion of white and yellow clover the better,) while in the latter they should be regularly supplied with sweet meadow hay, or something similar, and a suitable quantity of turnips or other succulent food. It is only from a strict attention being paid to such treatment during all the different stages of life, viz. from the calf to the full grown, and whether giving milk or 'yell,' that cows are reared with, or caused to retain those necessary qualities for the dairy; and any thing short of such treatment too frequently prevents the labour and expense, however ingeniously bestowed upon breeding from the best milking kinds, from being crowned with success. The following anecdote given by Mr. W. Aiton in the 49th No. of the Farmer's Magazine, page 59, will serve to show the imperfection of good feeding when only bestowed for immediate use. "Some think it is needless to give cows milky food when they are not in milk. I met, some years ago, with a clergyman attending the funeral of one of his parishioners, mounted on a large, meagre, lean horse, and labouring hard with *staff* and *spur* to keep up with the procession. On a relative of the deceased urging him to accompany the funeral to the grave, he said he meant to have done so, but found his horse could not travel; which was surprising, as he had given him *three measures of grain that morning*. Some person present expressed a doubt, that the horse had not gotten as much every day. The clergyman said he had got no grain since last time he rode, about three weeks before. Too many farmers treat their dairy cows on the same principles as this worthy divine did his horse,—give them no milky food when yell. But those who do so, will find their cows as incapable of giving good milk after they calve, as the clergyman's horse was to travel, even when he had got *three measures of grain* that morning." Cattle intended either for the dairy or draught should be much handled when young, to render them tame and docile; and if for the latter, they ought to be early taught to lead, and occasionally two and two together, with the yoke upon them during the day only, so that a fortuitous accident may be timeously discovered.

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* The above is more applicable when cattle are tied up; the food, from being in such close connexion with the animal's breath, acquires an unpalatable flavour.

† The reason of cattle in general eating the coarsest kind of food better at the above season, is owing to their taste having been brought to it by degrees, by a regular falling off in the quality of the grass in autumn, and not being *then* reminded of its sweets as they are by "tastings" in the spring; besides, the above season is most suitable for feeding with turnips, along with which the coarsest provender ought always to be consumed.

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* It is not necessary for the growth of young cattle to receive coarser food as they advance in years; only, where there is one kind of food coarser than another, the coarsest ought always to be given to the oldest cattle, being better suited for their digestion than that of the younger ones.

Having now in this and in the preceding section described the general heads of the treatment necessary to be followed up throughout all the various stages of breeding and rearing, I shall therefore next, in like manner, proceed to do so throughout all the various stages of feeding, by endeavouring to show how to prepare calves or such cattle as are not destined to work or supply the dairy, in the most economical and profitable manner for the shambles, as likewise those that have been for a time so suitably employed.

SECTION V.

ON FATTENING.

The season of the year, time of life, and mode of fattening cattle, vary very materially according to the kind of stock, land, market, and judgment, of which the feeder may be in possession. But it certainly must be generally allowed that to feed seasonably and advantageously, the following circumstances must be minutely attended to, viz. that the season for fattening should be entirely regulated by the state of condition the animal is in, in order to insure a good and ready market; that the stated periods of life for fattening ought to be three, either when calves, (for veal) at maturity, or after having been employed a proper time for the purposes of the draught or dairy; and that at either of these last periods the system to be pursued may be that of stall feeding or grazing, just as the nature of the soil and other farming processes may best dictate. I shall, however, first endeavour to point out the disadvantages resulting from not paying proper attention to the above circumstances, and afterwards the management and food most suitable for the different systems and stages of making fat; which may all be equally advisable in the respective situations best adapted for them. To regulate the period for commencing feeding by the condition, and the time of *being* fat by the market, must obviously appear to be of infinite advantage; for, in the first place, to purchase a stock of very lean cattle in the spring, and be determined (or perhaps obliged, for want of food) to feed them off the following summer, or to purchase in autumn with the same determination or necessity of making fat the preceding winter, must evidently prove nine times in ten to be a disappointment, the season being generally half consumed before any visible improvement is made; and being thus disappointed at the end of the allotted period of having a fat stock, you are obliged to sell at half fat prices, animals which have consumed a greater proportion of fattening ingredients* than those would have done which would have brought full fat prices: hence the loss, operating in a two-fold manner, makes it of such consequence as to claim the attention of the feeder in no small degree to the state of condition at the first commencement, and prevent him from being insnared by the temptation of low prices, and in making vain attempts to feed lean stock fat in a short given period. In the second place, although the stock should be in a proper state to commence feeding for the shambles, if the time of putting them upon such food is not attended to, perhaps the cattle are ready for market, at a season when it is overstocked; for instance, cattle that are to be made fat upon winter food alone, which are late in being commenced, will not be ready for the butcher until sometime in the spring, when he most probably has early grass-finished beef at command, which being infinitely preferable, renders the winter-fed beef only saleable at a reduced price. To obviate such evils, let the stock intended to be put upon food preparatory for the shambles, be previously put into good condition, even with food of an inferior quality; and when in this state, if put upon good keeping early in the season, (whether in summer or winter,) they will be early ready, so as to embrace the first opportunity of a good market; for it will be found much easier to keep a stock when fat, in that state for a market, than to keep the market for them until they are made fat.

I shall now proceed to discuss the management and food necessary for the different systems and stages in life of feeding.

FATTENING OR VEALING CALVES.

It has been already shown in a former section, when the system of vealing should be introduced, it therefore now only remains to point out how it may be most profitably effected. Calves intended for this purpose should be tied up† in a dark well-aired house, paved with stones, having a regular descent to carry off all urine, &c. so that being bedded regularly every day with clean straw, and the stalls completely cleaned and sweeped out twice a week, they may be kept always clean and dry, and free of any offensive smell: this will not only tend to facilitate the fattening, but improve the flavour of the veal. As to the most suitable food to be used, I believe nothing will excel that designed by nature, both for quick feeding, and producing the best flavoured veal. The milk may either be given to the calves (in a kit) immediately when taken from the cows, or they may be allowed to suck their dams; but the latter should only be preferred when the whole of a cow's milk is designed for a calf, and not even then, unless the cow can be conveniently taken to the calf, and not the calf to the cow, as is most common; for in the latter case the calf is too much exposed to immoderate exercise. However, to manage this properly, would require a house with pens railed off with wood for each calf, sufficiently wide to admit the cow to turn in it; a wide passage must be left behind the pens for a communication to each. The cows ought to be admitted three times a day, at stated periods, punctually attended to, say six o'clock in the morning, twelve at noon, and six in the evening: the calves should have a little chalk or rock salt to lick during the absence of their dams.

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* It may be observed that any lean hungered-looking animal will eat more food than one in good condition, and always as the condition improves, the appetite is more easily satisfied, and the animal acquires a more refined taste; hence the finest of the food should always be retained for finishing with.

† Tying up and darkness are necessary to avoid exercise, which those play-

But in most cases feeding by the hand will be found preferable, when all the necessary difference to be observed, is to present the kit to the calf, instead of the cow, three times a day, with a satisfactory supply of milk as near the

ful animals are so apt to take in an immoderate degree, which is prejudicial to fattening. The proper method of tying a calf is with a band or strap, put round its neck, with a swivel joining it and the rope or chain that is fastened to the stake. Some people, however, prefer the Dutch mode of fattening calves, by confining them in short narrow pens, untied, but not able to turn round. The pens are quite dark, and the floors are made of lattice work raised considerably from the ground, so that the calves always lie dry; when they are to receive their milk, a small door (sufficient to admit the head) is opened, when they immediately, on perceiving the light, push out their ads, and put them into milk pails which are presented to them. See Mal- l's *Compendium of Modern Husbandry*, vol. i. p. 354.

state in which the calf would receive it, if sucking, as possible.[*] But new milk being in most situations too valuable to be turned into veal, a substitute therefore may with great propriety and saving be introduced; for although I dissapproved very much of artificial substitutes for milk in the section upon rearing calves, I will as readily approve of them in this case, particularly when milk can be disposed of to advantage; for here immediate profit alone is the sole object, which was quite the reverse in the other case. The various kinds of artificial food which have of late years been in the greatest repute under my observation, are linseed-jelly, hay-tea, gruels[†] of oat, barley, or peas meal, treacle mixed with milk; but those which have been found from experience to be best adapted for fattening, are the linseed-jelly and peas meal. In using artificial food I would therefore recommend that the morning meal of milk (in order to lessen the quantity) should be mixed with peas meal; give a quantity of linseed jelly at noon;[‡] and repeat the morning meal in the evening. In fattening and rearing calves, the state of their bowels must be carefully attended to, as it not unfrequently happens that they die, or some lingering disease is brought on from the want of passage.

Bleeding,[§] the last two weeks of feeding, improves the appearance of the veal very much. As to the time in which a calf requires to be made fat, it will vary according to circumstances, either in the animal itself, in the food, or the giver of it; but one that takes more than six or eight weeks to make it good veal, either has not been deserving of justice, or has not received it.

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[*] To give milk to calves in a proper temperature of heat, one maid ought to be carrying away the milk and serving the calves, while another is milking it, and not first milking all the cows, and then serving the calves; which common practice, when joined with the time occupied with the dairy maids rehearsing over future and expected events after they have finished the milking operation, too frequently is the cause of that mortal disease called the strings or cords, occasioned from the milk being too cold.

[†] The usual mode of making gruel for calves with peas or other meal, is to mix one quart of meal with ten or twelve of water, boiling it for about half an hour, and then let it stand until lukewarm.

[‡] I would prefer giving the jelly at noon, so that the cows might not be disturbed by taking them from their pasture, particularly where they have a considerable distance to travel, or may from necessity be widely dispersed in search of food.

[§] A quart of blood taken at one time is generally found sufficient, with an interval of five or six days.

FATTENING CATTLE ARRIVED AT MATURITY.*

This may be said to be the next proper stage of life for fattening, and may either be accomplished by grazing in the fields or stall feeding, each system having its advantages according to situation. The former must be applied when the pasture is of a kindly nature to fatten, without being inclined to rush up to any length rapidly, such as old natural pastures producing grass of a short sweet pile, but not capable of being put under tillage to advantage, or perhaps prohibited from being so; and the latter is most advantageously applied when a farm is under a regular course of tillage: for, an acre, by good management, and cutting the grass instead of grazing, may be made to produce nearly double the quantity of beef fit for a market, and the manure so collected will be infinitely of more advantage to the land, both with respect to quantity and quality, than that dried upon the surface by wind and the scorching heat of the sun: besides, in this system, the expense of making and keeping up fences is not necessary, a very material object when a landlord happens to be so contracted as not to give the tenant any encouragement in that respect, or perhaps so situated as not to be able to do so. In short, stall feeding should always be adopted where it is at all eligible, and particularly when tillage is connected, as it is making the most of the produce of the land, none being trampled under foot or otherwise wasted; for while the best is all applied to feeding, the worst is likewise so, and converted into valuable manure: for it may be daily observed, that cattle seldom or never reject almost any kind of plants when cut and given them in the house, whereas they will not put a mouth upon some of the same plants if grazing in the fields; and likewise the old adage of "a cow having two mouths when grazing upon soft or wet land," is always less or more verified according to the nature of the soil or grass. But being well aware that there are situations (and not unfrequently in the same farm) that claim the particular attention of both systems, I shall here only proceed to treat of the proper method of stall feeding, leaving the grazing in the fields to be discussed in the section on fattening, in chapter on grazing farms.

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* What is more particularly here meant by maturity, is when cattle are capable of being made fat to advantage; for although they will in general make sooner fat when at full growth, yet some kinds will in some situations get fat, and pay more, by being fed off before that period.

Stall feeding is performed by cattle standing constantly in the house, and having the different kinds of food carried to them. The kinds of food mostly in use for this process in summer,* are natural grass, red clover and ryegrass, lucern, tares, &c.; and those in winter, hay, turnips, carrots, parsnips, beet, or root of scarcity, cabbage, thousand-leaved anjow, tares, oil-cake, linseed-jelly, unthrashed oats, potatoes, brewers' wash and grains, &c.; all of which will less or more tend to fatten, but the culture, or procuring of many of them, becomes too expensive ever to render them *profitably* applicable to general use: let such of them, therefore, as the situation is best calculated to afford with certainty, and at a moderate expense, have the preference. A variety is however sometimes necessary to create and force an appetite. Although this is not so necessary in summer, when cut grass and clover will be found sufficient, yet the rapidity of fattening may sometimes be much increased by the application of other food, such as cabbage or tares, &c. and in winter, hay, turnips, steamed potatoes,† carrots, and unthrashed oats, may all be found necessary to encourage quick fattening. All the above kinds of food may however be administered without having the proper and desired effect, if cleanliness and method are not minutely attended to in the distribution of them. The following particulars are therefore quite indispensable to insure successful stall feeding. In summer, cattle ought to be kept as cool as possible, and the grass, &c. always given them in a fresh state, never being more than twelve hours cut when it can be avoided, nor cut early in the morning or late at night, the dew at these periods being generally found superfluous moisture; and when grass is cut in that state, or wet from rain, it much sooner loses its flavour, and cattle consequently lose their relish for it: let it therefore be cut as dry and kept as much so as possible. With respect to the necessary or stated quantity allotted for each animal, (which is given by most writers on the subject,) there ought to be none,* as I would invariably give them as much as they could eat, taking particular care to remove any superfluous food from their cribs instantly on observing that they either reject or become careless about it. But although no exact stated quantity of food can with propriety be adopted, yet stated periods for giving it must be most minutely attended to. Three times a day is very common, and has long been practised under the denomination of breakfast, dinner, and supper; but I would likewise be inclined to indulge them with two luncheons, seeing such additional

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* Stall feeding in summer, with green food, is generally termed soiling, and is frequently done in England in open sheds, for the support and improvement of young or aged lean stock, without attempting to make them fat.

† Potatoes given in a raw state are as useless for fattening as they are useful for rearing; for the latter purpose, when given in moderate quantities, they are equally good for all kinds of stock, but when intended for fattening they should always be steamed, as a quantity thus prepared will fatten more than double that quantity given in a raw state; indeed an animal can scarce be made fat with raw potatoes. This is clearly demonstrated in the feeding of pigs, which I have frequently attempted to make fat with raw potatoes, and even with the assistance of a little meal being put upon them, found it very slow and ineffectual; but immediately on commencing the steaming operation the animals daily improved, and in a very short time became thoroughly fat. There are various ways of steaming potatoes and other roots, but the most simple, (which I have adopted to a considerable extent in preparing food for pigs, cows, and work horses,) is to have a fixed boiler, which may be used for various other purposes, and fix a large barrel or half hogshead upon the top of it, letting it sink from one to two inches into the boiler; and in the bottom of

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the barrel must be a number of auger holes to allow the steam to ascend through the potatoes with which it is filled; the barrel or steamer must have a cover close fixed on the top, and when the boiler is nearly filled with water, so that it may almost touch the steamer, the space or seam at the joining of the two must be filled up close with a wet cloth. Should it be necessary to have the steamer large, a pulley must be fixed immediately above it, so as to remove it from the top of the boiler to take out the potatoes when ready.

* It not unfrequently, and from various unknown causes, happens, that cattle will eat considerably more at one time than another, and almost invariably less as they become fatter; therefore the same portion of food would at one time either be enough or too much, while it would at another time be quite inadequate to satisfy the craving appetite, and thereby leave the animals in an unsatisfied state, which prevents rest and sleep, two indispensable requisites to fattening. It is the business of the feeder to observe when any one of his stock is off its food, and in proportion as it rejects its supper, give less to breakfast, and so on until the appetite is quite restored.

meals are attended with favourable consequences; for, by being fed often they never get too hungry, and thereby do not overload the stomach; so that by frequent feeding, with regular intervals,* and giving no more food at one time than what they will eagerly consume, a continual relish may be kept up for a fresh supply of food, without which no animal can be fed to perfection. In winter, the intervals between the periods of feeding may be the same, only for convenience the commencement of feeding may be an hour longer* in the morning, and the food distributed in the following manner, viz. at six o'clock in the morning give a small sheaf of unthrashed oats, and when finished, give a small feed of well-cleaned turnips, clear of tops and roots, after which a little hay may be given; at ten o'clock, give a feed of steamed potatoes and hay after; at two o'clock p. m. repeat the first morning feed without the oats; and for supper, which will be ten o'clock at night, repeat the second morning meal. However, it may sometimes be found prudent, both in respect of the scarcity and expense of some of the kinds of food recommended, and for cattle losing their relish for them, to make use of the following substitutes: instead of oats in the morning, give a little fine oat straw or hay previous to giving the feed of turnips; potatoes in a raw state, with a handful of rough-ground meal, may occasionally be substituted for the turnip feeds,† and fine oat straw instead of hay. I have seen such substitutes feed cattle quickly, and make excellent beef.‡

It must be remembered that the food, and mode of giving it to cattle, already recommended, is for such as have arrived at maturity: but there are numbers (owing to their usefulness in the dairy and yoke) that are considerably past this period before they are put to fatten; such ought to be fed in summer either in or out of the house as circumstances may best dictate, for the winter process will be found very troublesome and frequently ineffectual:* but when the feeding of such cattle at such a season is inevitable, let all the soft and easily chewed food be given, which most of kinds can be reduced to by means of fire; and if turnips or potatoes are given in a raw state, let them be cut into thin broad slices; but brewers' grains, steamed potatoes, with a little rough-ground meal upon them, or similarly prepared food, will be found almost in such cases to be quite unavoidable in order to make a satisfactory finish. But to allow cattle to be so far advanced in life before they are put to fatten, ought to be seriously guarded against, unless their milking or working qualities are very superior indeed; for while the over-continuance of the use of such qualities does make one shilling, it loses two when such cattle are put up to fatten.

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* About four hours is a proper interval, such as feeding at five and nine o'clock a. m. and at one, five, and nine, p. m.; all of which periods must be minutely attended to, otherwise the animals will fret and lose beef while they ought to be gaining it.

† When the proportion of turnips is so great, the beef will have a strong taste of them; this is however completely prevented when cattle are fed as above described.

‡ I once fed eight Galloway cows four months in winter, which had all given milk during the preceding summer; the four quarters of each weighing upon an average thirty-five stone, (of 14lb. to the stone,) and tallow from nine to ten stone each. The first two months I allowed them nothing but straw, turnips, and raw potatoes; and the last two months, unthrashed oats, hay, turnips, and steamed potatoes, with a little meal upon them; which food was given connected and timed as above stated.

Cleanliness being so beneficial and essential in feeding any animal, this must be carefully attended to both in giving the food and keeping the animal itself clean.† In order therefore to accomplish this, let the following brief remarks never be lost sight of, viz. always put clean food into a clean crib, and keep a clean animal lying upon a clean bed; when these and the preceding remarks on fattening cattle are reduced to practice, they will seldom or never fail in furnishing an animal (in due season) yielding merit to the feeder, profit to the owner, credit to the butcher, and pleasure and satisfaction to the consumer.

* When cattle are so old that their teeth are either entirely gone or become 'blunt stumps,' they are not capable of eating most of the winter food; and when they are, it is not chewed in such a manner as to become digestible, consequently the fattening qualities being mostly lost, the food merely operates as a kind of nourishment.

† Feeding cattle which are so fixed as not to be able to go through the natural and regular process of licking and rubbing themselves, ought to be well combed at least once a day with a wool card, and afterwards well rubbed over with straw; this will make them rest quietly and sleep, which will add considerably to their comfort, and greatly facilitate their fattening.

SECTION VI.

MOST PREVALENT DISEASES.

The incidental diseases among this species of animals, although various, are neither so numerous nor so frequent as those generally attached to horses; which may be attributed to the one undergoing more labour and fatigue than the other, and consequently more exposed to sudden transitions from heat to cold, which are good mothers and nurses to most diseases. But although diseases are less numerous and frequent among neat cattle than horses, yet many of them prove more fatal to the former than the latter. I am however convinced, that by a strict adherence to the management prescribed in the preceding pages of this chapter, the number of diseases will not only be greatly diminished, but the mortality of them rendered almost extinct; but I am likewise aware that, notwithstanding the utmost care and attention being paid, fortuitous diseases will occur, which, if not timeously and judiciously attended to, will but too frequently prove fatal. In order, therefore, to be prepared to meet such unavoidable disorders, I shall first proceed to explain the symptoms, and next prescribe preventives and cures for such as are constitutional, which may be looked for at certain stages of life, and seasons of the year, as well as some other casual ones which have come under my own observation and experience, leaving those which I am yet unacquainted with, to be explained and cured by the recommendation of others who may have had a more extensive experience in that art.

The first and most essential point to be here obtained, is to know, from the first slight symptoms, the nature of the approaching disease; the proper preventives can then be had immediate recourse to: but should such symptoms have unfortunately passed unnoticed until the disease is clearly established, and perhaps at a height, the next necessary point then to be aimed at is, perfection in the discrimination of different diseases, by not only quickly discerning that it is not such a disease, but that it is *such* a one, then the proper *cure* can be applied; for it is in the taking of one disease for another, and the wrong application of the methods of cure, that causes so many valuable prescriptions, both for preventive and cure, to prove so ineffectual; hence the ingenious discoveries of one man are condemned or concealed by the ignorance or prejudice of another.* In order, therefore, to do away such obvious evils, I shall endeavour to explain the different symptoms peculiar to the diseases which I intend here to take notice of, I trust, in such a manner, that a person with an unprejudiced mind, even with a moderate capacity, will readily verify the old adage, "of putting the saddle on the right horse." But before treating of the diseases separately, it may first be proper to take a summary view of the method of bleeding and performing other necessary operations; of administering medicine, and the treatment requisite before and after such applications; likewise the proper quantity of blood to be taken, and medicine given, both of which must vary according to the age and constitution of the animal, and nature of the disease.

BLEEDING.

This art is now so generally known as to render little or no explanation necessary. It is commonly performed upon the near side of the neck,† a little farther from the head than the place approven of for bleeding horses, and executed with a much larger fleam or lancet.‡ If this operation is performed upon cattle which are constantly in the fields, they ought to be put into a shed all night after being bled, without either receiving meat or allowed to drink cold water,* as the former may cause the orifice to break out and bleed again, and the latter is apt to chill the blood. Bleeding is generally productive of good effects when judiciously applied, but the contrary when injudiciously. It ought to be resorted to in all cases where there is the slightest appearance of, or cause to suspect, either internal or external inflammation and stagnation of blood, whether occasioned by disease or accident. No stated quantity of blood to be taken at one time can be given, as it must vary from one to three, or even four quarts. If an animal is full of flesh, more may be taken than from one that is in low condition; and one in health should not be bled so copiously as one diseased, neither should so much by one-third be taken when physic is intended to accompany it, or to be administered soon after. In ordinary cases, from one to two quarts may be taken at once,† and when occasion requires, repeated in twenty four hours; but when the disease is of an inflammatory nature, the quantity ought to be increased: however, rather than run any risk in exceeding, in this particular, a more frequent repetition of the operation ought to be preferred. The blood should always be preserved to ascertain the quality of it. If after it has coagulated, a light-coloured jelly is formed on the top or surface, it is a sure proof of inflammation; but when the animal is healthy, the coagulation will be of a pure red colour, with a small quantity of watery fluid upon its surface. Should the use of rowels, issues, or blistering, be found necessary, (as will seldom be the case among neat cattle,) see description of them, chapter i. page 29, on horses.

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* Valuable discoveries in the above case, as well as throughout the various departments in the management of live stock, are too frequently condemned by illiberal prejudices.

† It is however found more effectual in some cases, to bleed by paring the hoof, or cutting the tail, which shall be hereafter noticed, when treating of the diseases or accidents which demand these modes of bleeding.

‡ For the method of executing the above operation, see chapter on Horses, page 27.

MEDICINE.

Such as is in general use for neat cattle, is of a cathartic and cordial nature; the latter is generally given to strengthen a subject much reduced by the effects of the former; they are both given in a liquid state.* It is not necessary to prepare neat cattle previous to administering physic, as is the case with horses, for they are generally in such a habit of body as to render its operation easy; all that is therefore necessary, is to give it after a few hours fasting, (for the more empty the stomach the better,) and during the time it is operating, to keep the animal moderately warm, and give warm drinks and mashes,† to encourage and assist the desired effect of the medicine: such treatment should be continued for a day or two, until the animal has completely recovered from the effects of the medicine, when the usual diet may again be given, carefully avoiding all sudden exposures to cold. The quantity of medicine necessary for one dose, will depend much upon the age and constitution of the animal: great caution is here however necessary; for when too little is given, it will not only prove ineffectual, but injurious to the cure, and too much may cause instant death: a person, therefore, attempting to prescribe or give medicine, ought to be thoroughly acquainted with the nature and power of the animal frame,—the symptom of disease,—and likewise the quality and operative powers of medicines. The following rule for proportionating medicine to cattle of different ages, I have in general found to answer, viz. one pound of salts given as one dose for an animal arrived at maturity, ‡ three quarters of a pound for a two to three years old, and half a pound for a stirk to a two years old. In like manner may all other doses of medicines recommended for full-grown cattle be reduced for those not arrived at maturity, keeping in mind, that if the animal arrived at full age be naturally of a delicate constitution, or so reduced by some chronic disease, so that three quarters of the usual dose may be sufficient, the same proportion, as already stated, must extend to the different ages above mentioned, allowing that they are likewise in a similar natural or reduced state of constitution.

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* When circumstances require that cattle in health should be bled, such as to prevent disease or check inflammation, cold water may be given a few hours after; but, for those diseased, or whose constitutions are impaired by some chronic disease, the cold air should be taken off before it is given to them.

† The above quantity is rather too much for milch cows, (sixteen ounces being sufficient,) unless in urgent cases, when preservation of life, and not of health, is the object; indeed it is only in such cases that bleeding should be performed at all upon milch cows, for the loss of blood is generally accompanied with the loss of milk.

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* Medicine is given to cattle by one or more people holding up the head, while another pours it into the throat with a bottle or horn introduced at the one side of the mouth, pouring it slowly, with intervals, so as not to choke the animal.

† See note 2d, page 105.

‡ If the animal is strong and robust, the above quantity will be found no more than sufficient; and those labouring under a high state of fever will require more than if they had not been so affected.

Further, an animal having undergone one course of physic, and a second being necessary, it must either be composed of milder ingredients, or a smaller quantity; and when a dose given does not operate, (which ought to be in the course of twelve or fourteen hours after receiving it) half the quantity must be repeated, which in general will prove effectual. For the utility of clysters, and mode of giving them, see chapter on Horses, section v. page 33; and when the administration of such is found necessary or advisable, the following recipes will be found both safe and efficacious.

Anodyne Clysters.

Take sheep's head broth, three pints; laudanum, one ounce. Or, dissolve from half a drachm to a drachm of opium in some broth or gruel, &c.

Carminative Clyster.

Take camomile flowers, sweet fennel seeds, caraway seeds, and coriander seeds, each one ounce; bruise them; water, three pints; boil five minutes, strain, and add two ounces of electuary of bay berries, and one ounce of soot.

Emollient Clysters.

Take milk gruel, three pints; sweet oil, half a pint. Or, sheep's head broth, one or two quarts.

Purging Clysters.

Take gruel, three pints, or two quarts; Epsom salt, or common salt, syrup of buckthorn, sweet oil, or linseed oil, each four ounces. Or, boil a handful of bear's foot and camomile flowers, in three pints of water, a few minutes; strain, and add half a pint of linseed oil, and four ounces of syrup of buckthorn. This clyster may be made more purging by adding senna or bitter apple.

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* The time for physic operating, will vary according to the state of the body and the strength of the ingredients, but should there be no symptoms of its beginning to operate at the end of twenty hours, half a dose should be repeated.

Restringent Clyster.

Take logwood chips, two ounces; balustine flowers, one ounce; water, two quarts; boil to one; and then add two ounces of diascordium, and one ounce of armenian bole.—*Farmers (old) Magazine*, vol. i.

To avoid repetition in prescribing medicine for the following diseases, which will come under my notice at present, I shall first give a selection of the cheapest and most simple recipes, found from experience to be both powerful and safe; and afterwards refer to them according as the different diseases may call forth their aid.

Cathartics for Calves.

No. 1.—Take rhubarb in powder, two drachms; oil of castor, one ounce; kali, prepared, one tea spoonful: mix, and give in a pint of warm milk.

No. 2.—Glauber salts, three ounces; ginger in powder, and aniseeds fresh powdered, of each half an ounce; treacle, two table spoonfuls: put the whole in a pitcher, and pour a pint of boiling water upon the ingredients. Cover them down, and when new milk warm, give the drink.

No. 3.—Glauber salts, four ounces; rhubarb in powder, two drachms; ginger, caraway seeds, and aniseeds, fresh powdered, of each half an ounce; treacle, three table spoonfuls. To be prepared and given as No. 2.

No. 4.—Castor oil, four ounces; rhubarb in powder, two drachms; prepared kali, one drachm; ginger and aniseeds, fresh powdered, of each half an ounce; treacle, two table spoonfuls. To be given in a pint of warm gruel.

For a calf one month old, give recipe No. 1; and for one from four to six weeks old, the ingredients may be doubled, with the addition of one tea spoonful of tincture of opium; but when six weeks old, give No. 2; and when eight weeks old, No. 3; or, in inflammatory cases, give No. 4.—Clater's *Cattle Doctor.*

Cordial Drinks for Calves.

No. 1.—Peruvian bark in powder, and ginger fresh powdered, of each two drachms. Mix, and give them in half a pint of new milk. This drink may be given once or twice a day for a few days, to a calf under one month old.

No. 2.—Aniseeds, and caraway seeds, fresh powdered, of each one ounce; coriander seeds, ginger, grains of paradise, fresh powdered, of each half an ounce; treacle, two table spoonfuls; a piece of butter of the size of a walnut. Put the ingredients into a pitcher, and pour a pint of boiling ale upon them. Cover the whole up until lukewarm, and then give it. This drink is suitable for any age, and is found to remove indisposition, strengthen the stomach, and promote an appetite.—Clater's *Cattle Doctor.*

Cathartics for Aged Cattle.

No. 1.—Glauber salts, one pound; ginger, in powder, two ounces; treacle, four ounces.

No. 2.—Epsom salts, one pound; aniseeds and ginger, in powder, each two ounces; treacle, four ounces.

No. 3.—Glauber salts, one pound; tartarised antimony, one drachm; camphor, two drachms; treacle, four ounces. When lukewarm, add tincture of opium, half an ounce.

The above purgative drinks may all be prepared in a similar manner by mixing the ingredients and pouring three pints of boiling water upon them, and given when lukewarm. In cases of inflammation, No. 3. must be given, and after it has sufficiently evacuated the intestines, the following powders must be given every morning and evening in a pint of warm gruel, as long as the inflammatory symptoms remain. White antimonial powder, two drachms; nitre, one ounce; camphor, in powder, and tincture of opium, of each two drachms. Mix for one dose.—Clater's *Cattle Doctor.*

Cordial Drinks for Aged Cattle.

No. 1.—Aniseeds, caraway seeds, grains of paradise, and fenugreek, of each two ounces, in powder. Mix them together for one drink.

No. 2.—Sweet fennel seeds, and cummin seeds, of each two ounces in powder; long pepper, turmeric, ginger, and enula campana (Elecampane), each one ounce in powder. Mix for one drink.

Either of the above drinks may be prepared by putting the ingredients into a pitcher with two ounces of fresh butter, and two table spoonfuls of treacle, or coarse sugar; pour one quart of boiling ale upon the whole, cover the pitcher, and let the drink stand until lukewarm, when it may be given.

No. 3.—*Gruel.* Take an equal quantity of linseed in powder and oat-meal, sweetened with coarse sugar or treacle, and half an ounce of nitre, and a little common salt; make them into a stiff gruel, by boiling them in a sufficient quantity of water.

No. 4.—Peruvian bark, in powder, one ounce; ginger, and grains of paradise, in powder, of each half an ounce; aniseeds, caraway seeds, and sweet fennel seeds, in powder, of each two ounces; salt of tartar, half an ounce; treacle, four table spoonfuls. Mix and give it in a quart of warm gruel, with the addition of a wine glassful of gin or brandy. —Clater's *Cattle Doctor.*

For destroying Worms.

No. 1.—Chop to pieces some savin-tops, and leaves of bear's-foot; mix with these a little salt of steel, and work up the whole into a sort of paste with butter. Divide into small balls, and give one of them early every morning for a week or longer; the animal must have no meat for about three hours after receiving the ball, but may be allowed a moderate quantity of liquid. Should the above medicine not prove effectual alone, it may be assisted by giving the following drink every morning after the ball. Dissolve half an ounce of black soap in six quarts of sweet wort. —*Complete Cattle Doctor.*

No. 2.—Take wormwood and savin, of each two ounces; Indian pink, half an ounce; cut or bruise them small, and put them in a pitcher, and pour a quantity of boiling water upon them; cover the pitcher and let it stand in a warm place for about ten or twelve hours, then strain the liquor through a cloth, and add to it ginger, in powder, half an ounce; aniseeds, fresh powdered, two ounces; linseed oil, two table spoonfuls. Mix and give when lukewarm.—Clater's *Cattle Doctor.*

Lotion for a swollen Udder.

No. 1.—Goulard extract, four ounces; camphorated spirit of wine, eight ounces; white vitriol, one ounce; rain water that has been boiled, one quart. Mix and put them in a bottle for use.

No. 2.—Nitre, four ounces; vinegar, one quart; dissolve the nitre in the vinegar; add oil of vitriol, one ounce; tincture of opium, two ounces; camphorated spirits of wine, four ounces. Mix them together in a bottle for use. —Clater's *Cattle Doctor.*

Emollient Liniment for a swollen Udder.

No. 1.—Elder ointment, marsh-mallow ointment, and soft soap, of each four ounces; spirit of turpentine, two ounces; oil of origanum, half an ounce. Mix the whole well together on a slab, and keep in a pot for use.

No. 2.—Neat's-foot oil, eight ounces; spirit of turpentine, and spirit of sal-ammoniac with lime, of each four ounces; camphorated spirit of wine, six ounces; oil of origanum, and tincture of opium, of each two ounces. Mix and shake them well together in a bottle for use.—Clater's *Cattle Doctor.*

Ointment for destroying Lice.

Hog's-lard, two pounds; spirit of turpentine, half a pint; oil of vitriol, one ounce. Mix them gradually, and when united, add half a pint of whale oil; and stavesacre, in powder, half a pound.—Clater's *Cattle Doctor.*

For removing a Cough or Hoosing.

No. 1.—(For Calves.) Pour half a table spoonful of spirit of turpentine into the calf's nostrils, which must be held upwards, in order that the turpentine may flow into the throat; at the same time, the nose should be smeared with tar, and the animal kept within doors for a few hours, repeating this treatment as often as the cough is troublesome.

No. 2.—(For cows or aged cattle.) Pulverised aniseed, tar, vinegar of squills, of each one ounce; infused in a quart of warm ale, sweetened with honey. This drench must be given every day for some weeks if found necessary.

Drench for Murrain.

No. 1.—Beat in a marble mortar half a dozen large heads of garlic, press out the juice, and add to it an equal quantity of tincture of myrrh; to a quarter of a pint of this mixture, put half a pint of ale; after both are made lukewarm, add two spoonfuls of tar, and then give it to the animal.—*Complete Cattle Doctor.*

No. 2.—Alum in powder, four ounces; nitre and Peruvian bark, in powder, of each one ounce; treacle, four ounces. Mix for one drink, by adding a quart of hot gruel, and when lukewarm, a pint of vinegar.—Clater's *Cattle Doctor.*

Drench for Red-water.

No. 1.—" Take an ounce of bole-armenic, half an ounce of dragon's blood, two ounces of Castile soap, and one drachm of roche-alum. Dissolve these in a quart of hot ale, or beer, and let it stand until it is blood-warm; give this as one dose; and should it not have the desired effect, give the same quantity in about twelve hours after. This is not only an excellent medicine for changing the colour of the urine, but it acts as a purgative, which is generally necessary when the urine is discoloured."

No. 2.—" Take four ounces of oil of turpentine, and one ounce of bole-armenic, powdered, given cold in one quart of skimmed milk; afterwards rinse the horn and bowl the ingredients were mixed in, with one quart of spring water, and administer to the animal; let it then fast for two hours. If it is costive, give half an ounce of jalap in an English quart of new ale, with half a pound of treacle, pretty warm."

The above dose, No. 2, is too strong for cattle under two years; the ingredients must therefore be reduced when given to such as are under that age.

Drench for Cattle Hoven or Blown.

Three quarters of a pint of olive oil, and one pint of melted butter, or hog's lard, mixed together and given as one dose. From one to two wine glasses will answer for a sheep.—Young's *Annals of Agriculture.*

Drench to stop Purging.

Prepared chalk, four ounces; bole-armenic, and aniseeds, in powder, of each two ounces; ginger, in powder, one ounce; alum, in powder, three ounces; tincture of opium, half an ounce. Mix for one drink, and give in a quart of warm ale or gruel.—Clater's *Cattle Doctor.*

To dry a Cow of her Milk.

Take from three to four quarts of blood from her in the evening; and the following morning, after being clean milked, and two hours previous to being turned out to graze, give the following drink.

Roach alum, in powder, six ounces; (if a large beast, eight ounces;) bole-armenic in powder, two ounces. Mix and put them in a pitcher, then pour a pint and a half of boiling ale upon the ingredients; afterwards add a pint of good vinegar, and give when new milk warm.

The above drink may be repeated every fourth day after clean milking, for two, three, or more times, until the cow is completely dry.—Clater's *Cattle Doctor.*

To fumigate an Apartment.

Put an ounce of common salt in a varnished or glazed pipkin, and pour on it two ounces of spirit of vitriol, diluted with one ounce of water. Let the vessel be placed for one hour on a chafingdish full of live coals, in the centre of the house, so that the vapours may arise till the air is saturated.—*Complete Grazier.*

Having now described the operations, kind of medicine, and method of giving it, and treatment, &c. necessary in prescribing preventives and cures for the following diseases, I shall now proceed to take notice of them in order. First, those most prevalent to calves; second, those which cows are most frequently attacked with, and alone are peculiar to them; and, lastly, such as are subject to cattle in general.

CALVES.

NAVEL ILL.

This disease is the first with which calves are attacked in general, and although it is quite common and very fatal in some countries, yet it is almost unknown in others.[*]

Symptoms.—An inflammation of the navel string, (which takes place generally the first week,) accompanied with a difficulty of breathing, and discharge of saliva from the mouth and nose.

Preventive.—See treatment of navel string, &c. sect. on breeding, p. 107.

Cure.—Bleed to check the inflammation, and foment the swelling every two hours until it abate, with a hot infusion of camomile flowers and marsh-mallows, and give cathartic No. 1; and if the subject is much reduced, the cordial No. 1. may be given once a day until the calf is quite recovered.

CORDS.

This is among the first fatal diseases to which calves are subject, and is so called from a contraction of the small leaders or ligaments in the belly, which at an advanced stage of the disease become so much so that the whole body is drawn together. It is generally during the first month that calves are attacked with this disease; after this period they may in general be said to be out of danger of this malady. From its being peculiar only to such calves as are fed by the hand in close confinement, it must be pretty evident that it originates either from want of air and exercise, or from food being given in too cold a state, or perhaps a little of both; but I am inclined to believe it more frequently proceeds from the latter, seeing that it is almost unknown where calves are allowed to suck their dams, and never going out of the house, only receiving the exercise of a few yards from the stake or pen to their dam; and as a further proof of the propriety of my conjecture, I have invariably found this disease connected with an indolent byre maid;* and further, the first symptoms being a cold trembling fit, indicate the cause to be from some chilling internal application. But the veal of those calves which fall victims to this disease being extremely red, shows it to be of a plethoric and inflammatory nature; consequently bleeding once a week for a little has been found to be a good preventive, as also will be a good byre maid. As to a cure, it is seldom effected; but when early symptoms are perceived, bleeding copiously, and causing a perspiration by hard rubbing and covering from the cold, as likewise stretching the animal out from its contracted state, (by one person pulling by the fore legs and another by the hind ones,) will frequently prove effectual; after which the purgative and cordial drinks, as recommended in the last case, may be given if found necessary.

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[*] The above disease is most prevalent in warm climates and among the ger breeds of cattle.

WORMS.

This disease most generally attacks calves sometime after they are weaned, and is most prevalent and fatal among them in dry seasons when at grass.

Symptoms.—Hoosing or coughing, and as the disease increases, the skin becomes dry and adheres close to the flesh; the hair staring and the eye dull, with not unfrequently a slight discharge of white matter. Animals so affected generally cease to chew the cud, and if immediate recourse is not had to medicine adapted to the destruction of these reptiles, the animal so infested with them pines away like a person in a consumption.

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* I have always lost less or more calves when under the charge of a byre maid, who would give them their milk sometimes warm, and at other times quite cold, and would keep them lying starving upon a heap of dung for want of litter: but I have likewise had maids who would not on any account whatever have given young calves cold milk, neither keep them lying upon a cold wet bed; and when so situated, I never lost a single calf from the above disease.

Cure.—Give recipe No. 2. for destroying worms, or one table spoonful of spirit of turpentine, either of which may be given every third day for three or four times upon an empty stomach, and the animal may be turned to grass two or three hours after receiving the medicine; after an interval of ten days, should there be no symptoms of a cure, the same may be repeated. The above quantity of medicine is suitable for a calf from four to eight months old, and if younger, less of the ingredients will do; but the disease sometimes attacks cattle from one to two years old, in this case the ingredients must be increased, or give recipe No. 1. for worms.

MILCH COWS.

The only diseases which may be said to be peculiar to milch cows alone, are the affection of the udder and milk fever; the former is known by a variety of names, such as the downfall of the udder, gargle, garget in the bag, &c. There are, however, accidents which befal them that are sometimes styled diseases, such as slipping their calves, and difficulty of delivering the calf, and after-birth, all of which I have briefly noticed. (See section on breeding.)

GARGLE.

This disease is occasioned in various ways, but most frequently from bad milking, or neglect of using the proper means for putting cows completely dry when put to fatten, and consequently proceeds from a congealing of the milk in the udder.

Symptoms.—Swelling in the teats, sometimes accompanied with sore limbs, which, if neglected in this state, generally ends in a swollen and inflamed udder.

Preventive.—Clean milking, and putting completely dry when necessary. (See page 139.)

Cure.—If the cow is intended to be continued milking, rub well all the milk veins, udder, and teats, two or three times a day with any thing softening, such as marsh-mallow, goose grease, or hog's lard, &c.; after which, draw the teats clean of every kind of substance that will come from them three times a day, and give about half a drachm of calomel in a hornful of warm beer for three or four mornings; regular attention being paid to this treatment will in general prove effectual. Should the swelling and inflammation be considerable and likely to increase, rub with liniment No. 1. p. 137, and mix four ounces of nitre with one pound of common salt, give two table spoonfuls of the powder in a gallon of thin water gruel every three hours until it is finished. But in case the disorder, from neglect or otherwise, should display hard tumours, foment with camomile flowers and marsh-mallows as hot as the animal can bear it, continuing until the tumour open, when it must be encouraged to discharge matter until the substance be dispelled, (by keeping a rowel in the orifice,) and afterwards well cleaned and anointed with some healing ointment. Should the cow be intended to fatten, or the disease so far advanced as to leave no hope of cure without putting away the milk; in addition to the above treatment, first bleed and then give a full dose of salts.*

MILK FEVER.

This disorder is sometimes occasioned from neglect at the time of calving by the effects of cold; in this case treat as directed for colds, with the exception of taking no blood unless in cases of extreme urgency. It is most frequent in warm weather, and is chiefly peculiar to cows in high condition, with udders very full of milk, some days before calving, which causes a swelling and inflammation frequently to take place.

Symptoms.—Upon the second or third day after calving, a cold shivering fit comes on, accompanied with sickness; the head, horns, and breath are very hot, while parts of the body are cold; pulse quick, eye languid, and sometimes inflamed, tongue dry and parched; a hanging of the head, with foaming at the mouth, heavy and mournful groans, an aversion to food, with great eagerness to drink. These symptoms will partly, and sometimes wholly, appear in cases of fever, according to the different stages of the disease.

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* I have frequently known the above-mentioned disease so much neglected as to cause an amputation of the teats, and sometimes the udder, necessary, before a cure could be effected.

Preventive.—Rub the udder and milk veins two or three times a day before calving, with liniment No. 1. But should the swelling or inflammation still continue to increase, it will be necessary to milk the cow once or twice a day for a few days before she calves, and previous to rubbing with the liniment: bleeding is recommended by some, and is no doubt a good preventive.

Cure.—In order to check the disease in its infancy, give the cordial drink, (see recipe No. 4.) after which, should there be any appearance of relief from regular evacuations or otherwise, the drink may be repeated every other day for three times; but should the fever appear gradually to increase, the body must be kept open.* Cows labouring under this disease require great attention and much nursing, by keeping moderately warm, being clothed and lying dry, &c.; and if necessary, nourished with cordial No. 3. and kept in the house until completely recovered.

CATTLE IN GENERAL.

FELLON, EPIDEMIC COLD, OR INFLUENZA.

Cattle of every description, and all ages, are less or more liable to be affected with this disease; but young cattle and milch-cows are most subject to it, and *that* in the spring of the year: from their generally occupying the warmest situation, and being most pampered during winter, they are most susceptible of catching cold when exposed to the chilling winds in the spring. The cause, effects, and symptoms of this disease, are now so generally known as to require no illustration; but as they are similar in most respects to catarrh in horses, I shall therefore refer my reader to what I have already stated on that head in the chapter on diseases of horses, where it is described to be a universal mother and a general nurse to numerous disorders; consequently by here preventing the existence of, or speedily annihilating, such a parent, the ravages of a deadly offspring are completely frustrated, so that by due care and attention in this case the number of diseases may be greatly diminished, and many of those which are now so troublesome, expensive, and fatal, might in a short time be unknown. This disease proceeds from the pores of the body being so shut up as to put a stop to perspiration, which is generally occasioned by sudden transitions from heat to cold, or sometimes by a long exposure to cold without exercise: carefully avoiding either of these is therefore the only sure preventive. But if the disease is already established, treat as prescribed for catarrh, (see sect. v. on horses, p. 55,) only with this alteration, of giving the following medicine instead of that recommended for horses. In the first stage of the disease give cordial drink,* recipe No. 1; which may be repeated every day, or every other day, for three or four times, which by proper management will in most cases effect a cure.

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* See Cathartics, page 135.

The first symptoms produced from the effects of this disease are, slow dull motion, hanging down the head, with weeping eyes, hollow at the flank, rough staring coat and a hot breath; (if a milk cow, a sudden falling off in giving milk;) and if the hand is pressed upon the back, the animal will yield or give way, in which case the disease is in some countries termed the chine-fellon; but it sometimes happens that the joints are more particularly affected, when it is called the joint-fellon or rheumatism. In the latter case the joints should likewise be well rubbed twice a day with liniment No. 2. and kept very warm so as to encourage perspiration. When the disease seems obstinate,† and appears to increase, which, from the obstruction of the blood from its natural course, will soon cause an inflammation to take place in some internal part, (and at a more advanced stage the white of the eye will likewise appear much inflamed,*) which may be discovered by the body becoming alternately hot and cold, while the ears, horns, and feet, will generally feel cold; hence fever is produced, which mostly causes costiveness. When such are the symptoms, bleed, and give the purgative No. 1; or should the fever run high, No. 3. may be given, and afterwards a cordial drink, if thought necessary; and always in this and similar cases, when fever appears, rub the lips and teeth once a day with salt, as they frequently get foul, which prevents the animal's eating or drinking. This disease being very infectious, the patient should be separated from all other cattle, and kept in some detached apartment, until a cure is completed, when the animal may be allowed to join the stock, and the apartment fumigated.†

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* The above drink may be given in cases of slight cold, when cattle are at grass in summer, and by keeping them from food for a few hours after receiving it, they may again be turned out to grass.

† An animal affected with the above or any other disease, ought first carefully to be examined as to its body being in a proper temperature of heat, its excrement and urine being of a natural colour and consistency. Attention to these particulars is the surest guide for the further necessary treatment of the animal.

INTERNAL INFLAMMATIONS.

Those which are most common and fatal among cattle, are inflammations of the lungs, liver, and kidneys; they are generally occasioned by the effects of severe cold, or by some other sudden check of perspiration; also by external causes, such as strokes, bruises, &c. The symptoms generally, in all cases of internal inflammation, as has already been noticed, are an alternate heat and cold upon the body; but as there are symptoms by which each disease may be separately known, and the treatment for each being somewhat different, I shall take notice of them separately.

INFLAMMATION OF THE LUNGS.

Symptoms.—A difficulty in breathing, accompanied with a dry tickling cough, and sometimes a copious discharge of thick phlegm from the mouth and nose. This disease is likewise sometimes occasioned from eating acid vegetables, and also from an overloaded stomach: when either of which is the cause, a preventive will not be easily effected (particularly when cattle are grazing); but guarding against those evils as much as possible may occasionally prevent the disease. But when the inflammation arises from a stoppage of perspiration, the treatment already stated for colds will in most cases act as a sure preventive.

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* When the eye appears red and much inflamed, copious bleeding is generally indispensable.

† See recipe, p. 139.

Cure.—Bleed less or more, according to the violence of the disease, repeating it every other day until the inflammatory symptoms begin to abate; but reducing the system too low must be avoided; the bowels must be kept open, by giving one-half of the cathartic draught No. 1. in the morning, and the other half at night, every other day for two or three times, after which give a cordial drink.

INFLAMMATION OF THE LIVER.

Cattle in high condition are most subject to this disease, and that most frequently in warm weather, when they are overheated by driving, or running about the pastures, and afterwards suddenly exposed to cold, or drinking cold water when in a state of perspiration.

Symptoms.—Severe pain and much swelling about the short rib on the right side, difficulty in breathing, rejecting food, accompanied with an unquenchable thirst, yellowness over most parts of the body, which is most perceptible upon the white of the eye. To effect a cure, proceed as directed in the last case.

INFLAMMATION OF THE KIDNEYS.

This disease proceeds frequently from a stroke or severe sprain across the loins, or violent exercise in warm weather, and likewise from gravel being lodged within the kidneys.

Symptoms.—Great heat, and violent pain across the loins, upon which if the hand is pressed the animal will give way; urine high in the colour, and frequently discharged in small quantities, with much difficulty and pain; a great trembling of the body, accompanied with cold clammy states of perspiration.

Cure.—Bleed at commencement, and give the cathartic drink No. 3. a few hours thereafter; and when the symptoms begin to abate, a cordial drink may be given every other day until the animal is quite recovered. In order to remove costiveness, (which ought to be done on the slightest appearance of it,) apply one of the purging clysters; and should an extensive heat and pain across the loins still remain, rub once or twice a day with the emollient liniment, No. 2, page 137.

MURRAIN, OR PESTILENTIAL FEVER.

This contagious disease (although fortunately not very prevalent) is one of the most fatal to which neat cattle are subject; and those graziers who have been so fortunate as not to have become acquainted with it from experience, may either have read or heard of its dreadful ravages, particularly about sixty years ago on the continent, and afterwards in England; and as it does still occasionally prevail, it is highly necessary that every proprietor of cattle should become thoroughly acquainted with the symptoms and nature of the disease, so that an early discovery of its approach may be made, and immediate preventives applied, which, if not effectual upon such as show the symptoms, will generally prove so upon the remainder of the stock, which is desirable in all disorders, but more so in this case (and some others), as when the disease has arrived at a certain stage before a discovery is made, a cure may be almost said to be out of the question. This malady is said to originate from various causes, viz. drinking bad water, pasturing upon coarse rank grass after wet weather; but it most frequently proceeds from atmospherical effects, as it must be evident from some seasons, when it prevails most, that neighbouring stocks upon various kinds of pasture will be affected all at once, at least one or two in each, so that they cannot have caught the infection from each other, neither can it then have proceeded from any certain kind of pasture, but must have originated from some impurity in the air, being the only thing of which they may be said to have been equal partakers, or common to both at the time of infection. Cattle most liable to this infection are those whose blood is in a bad state; from the violence of the fever an instantaneous inflammation takes place in the throat, stomach, and intestines, which is generally accompanied with a swelling across the loins, or other parts of the body; and should this swelling when pressed by the hand make a crackling noise, it indicates a speedy mortification; but when the fever is timeously checked, the tumour will come to a height, form a good pus, and discharge in a proper manner; which are more favourable symptoms.

Symptoms.—The first appearance is a disordering of the whole animal frame some days previous to the outward symptoms, which are a trembling of the limbs, weeping eyes, sometimes dull and languid, and at other times sparkling and inflamed; aversion to food, and a difficulty of swallowing it, heaviness and debility of body. In a few days the breath and excrement become so fetid as to affect the surrounding air with the offensive vapours issuing from them. The head and breath are very hot, while the limbs and body are cold, eruptions take place in the mouth and upon the limbs, most of which symptoms continue to increase until the ninth day, which if the animal survive, it will generally recover.

Preventive.—Bleeding is mostly recommended, as it generally either prevents the infection, checks it, or mitigates the violence and fatality of the disorder when it does happen to ensue.

Cure.—Immediately on perceiving any one of the stock infected, let it be removed to some apartment by itself, and there kept warm until a cure be completed. First, bleed* as copiously as the state of the animal will admit, wash the mouth with warm vinegar, and a little salt dissolved in it, and give the murrain drink No. 1. (see p. 138,) to be repeated every four hours; and should no abatement of the disease take place the first day, bleed again the second, and continue the same course. But Mr. Clater seems to disagree with most writers on this subject by not bleeding on the first discovery of the disease, but giving the purging drink No. 3; and should the fever not be checked after the intestines are evacuated by this drink, he then recommends bleeding and giving the accompanying powders connected with that drink, in cases where inflammation still continues, when he adds, that by strict attention to such treatment, the fever will in general be removed in a few days; but should it continue to increase and proceed gradually to a state of putrefacti[illegible]give murrain drink No. 2.* once a day, or every other day, as circumstances may require; as soon as the swelling begins to appear on any part of the body, rub the lotion No. 2. well into all the places affected two or three times a day; but when the tumefied parts are progressively advancing to a state of suppuration, rub well two or three times a day with some of the emollient liniments. When the animal is reduced (as is generally the case in this disease), treat, as already recommended, with cordial drinks, &c. and fumigate the house which it has occupied during its illness, as directed for all cases of infectious diseases.† Many other preventives and cures have been administered, such as Peruvian or oak bark given in warm ale, and tar water, composed of one quart of tar and a gallon of water, three or four quarts of which being given two or three times a day (according to the size or age of the animal), and to be continued during the time of the malady. I would, however, give the preference to the first-mentioned treatment, having frequently seen the good effects of bleeding and inward application of garlic, both in this and in other inflammatory and infectious diseases. But from the rapidity, violence, and mortality of this disease, it would be vain to boast of never-failing success being derived from any remedies yet prescribed, particularly if not timeously applied.

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* Bleeding should be extended to the whole stock both to check slight imperceptible infections, (which may have been caught, either from the diseased animal previous to its removal from the stock, or from the same cause of its infection,) and lessen the ruinous effects of the disease, should it break out after every exertion has been made to prevent it; and should one after another seem to be infected, so that it has every appearance of going through the whole stock, give the murrain drink No. 1. to each, every morning for two or three days, always keeping them from the pasture for a few hours after receiving the drink.

BLACK LEG.

This disease is likewise known by the name of '*blue or black spall*,' 'black quarter,' or 'quarter ill.' Cattle of all ages are subject to this fatal malady, but it is most peculiar to year olds, and particularly those in good condition. It was first known in the north of England, about fifty years ago, when it committed great ravages, and has since found its way into various parts, both in England and Scotland, and not unfrequently proves very fatal. From the rapidity of this disorder, (as after the least symptoms are discovered, it generally ends in death in less than 24 hours,) a preventive is the only and most effectual object here to be attempted; an early discovery of the approaching disease is, however, sometimes attended with good effects; but at an advanced stage, all attempts at cure are fruitless and vain. But although this disease is more rapid in its progress and affords less time to effect a cure than most others, when it does commence, yet it possesses the advantage of giving more warning of its approach, as it will nine times in ten seize those in good condition, either in the spring of the year, early in summer, or the latter end of autumn:* but it likewise sometimes attacks those which have been starved during winter, the former most frequently early in spring, and the latter when the vegetable creation is in full perfection. The cause of this disease proceeds from an overflowing of the blood, occasioned by feeding unsparingly with rich succulent food, such as turnips, artificial grasses, &c.; hence guarding against such extremes, and paying due regard to the condition of the animal, and regulating the feeding accordingly, will prove one of the best preventives. †

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* Mr. Clater recommends bleeding, and giving the above drink as a preventive.

† See fumigation, p. 139.

Symptoms.—It very commonly appears first from the animal being lame, or having a slight halt; at other times the whole body seems to be debilitated, and a swelling ensues upon some part of it, but chiefly on the legs, shoulders, belly, or on some part of the back; when on the latter, the disease is considered most dangerous. When the hand is pressed upon the swelling, it makes a crackling noise, which is generally the first decided symptom of the disease.

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* Calves or young cattle highly fed with turnips in winter, are occasionally seized with the above disorder in that season.

† When a young animal inclines to become too fat, reduce the quality of the food; and if in a poor, starved, or unthriving state, bring it on by degrees, never attempting too sudden a change by high feeding. As a proof of the regularity of feeding, and not with too rich food, being essential as a preventive, it may be remarked, that poor people's stock are seldom or never affected with this disorder, which can only be attributed to the want of a command of rich artificial grasses and turnips, &c.; and when they have access to such, it is generally so limited as to cause its distribution in small quantities, and not too frequently repeated.

Preventive.—About the latter end of September bleed all the calves and stirks moderately, according to directions already given, (see p. 130,) and a few days afterwards rowel, button, or inoculate,[*] (as it is variously called in different countries,) with shred bear's-foot and garlic, an equal quantity of each bruised together, and mixed with fresh butter: or some use onions instead of garlic, while others use a small piece of garlic alone, about the size of a nut. These operations, when properly and timeously performed,[†] together with the attention recommended in feeding, will generally prevent the young grazier from knowing the symptoms of this disease from experience, and in vain searching for a cure.

Cure.—Immediately upon discovery of the complaint, remove the animal to a separate apartment, bleed copiously, and give a quick operating purge, regulated according to the age and constitution of the patient; scarify the parts affected, and fill up the orifices with finely pulverised nitre, fomenting the contiguous parts with stale urine, hemlock, and hens' dung, in order to prevent the spreading of the inflammation. Should no experienced scarifier be at hand, the tumefied parts may be dealt with as directed for the murrain. But as experience has strengthened my faith in the preventive, and weakened it respecting the cure, I would therefore recommend the former to be the principal object of dependence.

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[*] The above-mentioned operation is performed upon various parts of the body, but most generally in the dewlap, by making a small incision, and raising the skin on each side, so as to contain a small portion of the mixture (or garlic alone), about the size of a small nut, then stitching the orifice with a needle and thread, so as to prevent its coming out. The first time I heard of this inoculation was in Yorkshire, where it was performed with great success; its good effects have now caused it to be more generally known; it has been introduced into Scotland, and is now very common in several parts of Argyleshire, particularly in the island of Islay, where it is annually performed among the principal stocks, and in general proves of great service; instances are, however, there known of individual losses, notwithstanding this precaution having been used; this, however, may be ascribed to the fleam or lancet not being used along with garlic, which is used alone.

[†] The above operation ought to be performed regularly about the end of September (and in some instances must be repeated when it has not proved effectual), and not delayed, as is too common, until the death of one or more stock recalls to remembrance the necessity of performing such an ope-

RED-WATER OR BLOODY URINE.

This disorder, although at times general among cattle of both sexes, and different ages, yet it seems most peculiar to milch cows; and if a cure is not speedily effected, a lingering of the disease is frequently attended with fatal consequences. Authors seem to vary much in opinion respecting the origin of the disease; one will have it to be occasioned from catching cold in various ways; another from change of pasture, and scarcity of water during a long dry summer; while a third maintains it to originate either from a sudden change of atmosphere, eating acrid or prickly vegetables, bad or coarse food, or from drinking bad or stagnated water. Such opinions, however, may be all partly correct, being convinced that the same effects can originate from different causes; but the authors of those opinions differ so materially with respect to the necessary treatment of this disease, as to throw darkness instead of light upon the subject to a person ignorant about the nature of the disorder, but wishing to gain information from the opinion of others. The name of this disease at once indicating the universal symptoms, renders a farther illustration of them almost unnecessary; but as the proper treatment at various stages of the disease is somewhat different, it will be necessary to explain the variation of symptoms at these stages, so that the treatment may be varied accordingly.

Symptoms.—This disease generally commences with frequent but ineffectual attempts to stale, although at some of those attempts small discharges are effected of urine of a high brown colour; and as the disease increases, the staling becomes more painful, and the urine still of a higher tinge, until it assumes quite a bloody appearance; and when large quantities of this description come away, such symptoms are very unfavourable; but should costiveness ensue, it is still more so. Cattle so affected raise their backs, extend their tails, reject their food, and desert their companions.

Cure.—As I conceive the effects of this disease to be inflammation about the neck of the bladder, occasioned by several of the causes already assigned, (but more frequently by a continued scarcity of water, or a supply of it in a stagnant state,) I would first recommend a little blood to be taken, particularly if the animal be in a plethoric state of body: this would tend to check the farther advance of the inflammation. But I have invariably cured this disease, when perceived at an early period of its existence, by giving either a gentle dose of salts, or half a pound of common salt, dissolved in two or three quarts of water, or sour buttermilk: in the latter case all the attention necessary is to give the animal free access to clean pure water, if in summer; but if in winter, the cold air should be taken off it. Should salts be administered, see treatment, p. 131. My father used drench No. 1, p. 138, for upwards of forty years, and frequently under my inspection, which was attended with almost never-failing success. Drench No. 2, p. 138, which is something similar, is given by a correspondent to the Farmer's Magazine, in Nov. 1803, p. 402, where he says that he has not known it to fail in a single instance for upwards of twenty years. In the early stages of this disease, there is no doubt of one or other of the above remedies proving effectual; but should the disease prove obstinate, either from neglect of it at first, or otherwise, so that by lingering under costive habits and severe fever, there may be cause to suspect an inflammation to have taken place in some of the internal parts, as described in the preceding pages, in this case treat as there directed, according as the symptoms may point out the particular part or parts affected.

CHOLIC OR GRIPES.

This disease, when not properly attended to and speedily removed, frequently ends in instant death. Cattle of all ages are occasionally attacked with this painful malady, just as they may be exposed to the several causes of its origin; it is, however, not so common among neat cattle as horses; but as the causes, effects, symptoms, and mode of treatment of this disease, are so much similar in both species of stock, I shall consequently refer my reader to what has been already stated on this head for horses, only observing that if the same medicines are used, one-third less of each kind must be given, or when those recommended in this section are used, they must be selected according to the nature of the cholic.

BLOWN OR HOVEN.

This disease, or rather accident, is in some countries called the fog sickness, but is more generally known by either of the above appellations, which sufficiently indicates its symptoms. It is a common complaint among cattle, in most countries, and if not speedily removed, soon proves fatal. There are various causes assigned for its origin, but the most prevalent one proceeds from eating too eagerly of succulent food, such as clover, turnips, potatoes, &c. which thereby overcharges the stomach with confined air, so as to stop the chewing of the cud, and causes the body to swell. But it is likewise sometimes occasioned by the animal being choked with a potato, piece of turnip, or chaff, &c.

Preventive.—Should this disease proceed from the first-mentioned cause, when cattle are stall-fed, it may be easily prevented by giving such food in small portions to them, their appetites being first nearly satisfied with food known not to be injurious; this being continued for a few days, will accustom their stomachs to it, and cause them to eat more moderately, and consequently will place them out of all danger. To prevent this malady when cattle are grazing, previous to putting them into a rich succulent pasture, let their appetite be nearly satisfied with that to which they have been accustomed, and about noon after the dew is removed, if the day is dry, they may be turned into this new pasture for a few hours, causing a person occasionally to move them about the field, and afterwards to put them into a fold, and let them remain there all night without food;* early next morning turn them first into their old pasture† until about noon, and then proceed as on the preceding day, which being repeated for two or three days will be sufficient.

Cure.—Immediately on perceiving the animal blown, give either of the purging drinks, No. 1, or 2; or three quarters of a pint of olive oil, and one pint of melted butter, or hog's lard, to be repeated in half an hour, if no evacuating of the intestines takes place. I have frequently effected a cure, by dissolving about one pint of salt in a quart of water; and after giving it, caused the animal to be driven gently about. An English pint of gin or good whisky will in general effect a cure without any other assistance. Any of the above prescriptions, if applied in an early stage of the disease, will tend to check fermentation in the stomach, and evacuate the intestines, so as to afford immediate relief. But should the fermentation have already arrived at any height before the state of the animal is discovered, if immediate relief is not given, instant death ensues. There is no time left here for the operation of the quickest medicine, and nothing but external means will give relief, or save the animal. Various instruments have been invented for this purpose, two of which have come under my particular notice; one by the late Dr. Munro, professor of anatomy in Edinburgh, by whom it was announced to the public in 1793; another by Mr. Eager. For the information of those who may not have seen either of those instruments, I shall here subjoin a short description of them. Dr. Munro's consists of "iron wire, about one-sixteenth of an inch in diameter, twisted round a polished iron rod, three-eighths of an inch in diameter, in order to give it a cylindrical form; the wire is afterwards taken off, and covered with soft, smooth leather. To the end of the tube, which is intended to be passed into the stomach, a brass pipe, two inches long, of the same size as, or rather larger than the tube, is to be firmly connected; and to prevent the tube from bending too much within the mouth or gullet, an iron wire, one eighth of an inch in diameter, and of equal length with the tube, is placed within it, and withdrawn when such tube has entered the stomach. The tube is six feet long, in order to reach the stomach of the largest ox; when it has reached the stomach it may be allowed to remain for any length of time, as it will not impede the respiration of the animal; but as soon as the confined air has passed through the instrument it should be withdrawn."

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* Putting cattle into a fold all night without food will make them eagerly eat their old food next day, which they are not apt to do after once tasting something better, particularly if they are turned immediately back to it; but by standing part of a day and a night in a fold viewing the earth or stones, their old pasture next day even appears new to them, and seems to be a pleasant repast.

† Straw is preferable to any other kind of food to be given to cattle previous to turning them upon clover or rich pasture, when they will eat it.

Mr. Eager's instrument [*] is of two sizes, one about six feet long for cattle, another three feet for sheep; it consists of a round knob of wood secured to the end of a cane; Mr. E. directs one person to lay hold of the animal by the nostrils and one horn, while another holds the tongue with one hand and pushes the cane at full length down the throat with the other; and as soon as a fetid smell issues from the animal, and its body begins to sink, the cure is performed.

There is likewise another very simple and useful remedy for curing blown cattle, which is that of thrusting down the throat into the stomach a cane with a knob covered with a piece of flannel cloth dipped in tar, allowing it to remain about half a minute until the tar is dissolved in the stomach, when it must be drawn out gently.

It is, however, sometimes necessary to have recourse to paunching in very dangerous cases, or when there is no time to administer other remedies. It is generally performed by making an incision with a pen-knife on the left side between the short rib and the haunch bone, from about two to three inches lower than the latter, a tube is then introduced into the incision (such as a goose quill) and allowed to remain until all the fixed air has escaped, when the tube is taken out, and the orifice covered with a piece of plaster.[†]

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[*] A premium of fifty guineas was voted to Mr. Eager for his invention (by the London Society for the encouragement of Arts), in the year 1796.

[†] Paunching is now more generally performed with an instrument made for the purpose, known by the name of 'a cattle probe.' It may be had at most

Having now treated on most of the fatal diseases which attend neat cattle, and particularly those admitting of a preventive, and which require a minute description of symptoms so as to distinguish instantly and correctly the nature of them, in order that administrations may be properly and timeously applied, I shall now proceed to annex the most approved preventives and cures* to such disorders and accidents as require no description to make them known, but are most readily distinguished at first sight, or at least upon the slightest examination.

FOUL IN THE FOOT.

This disorder generally commences between the hoofs, and proceeds either from want of cleanliness, or from a superabundant flow of humours† which settles down into the feet.

Cure.—Wash clean with soap and warm water, and after the foot is well dried, put a hair rope betwixt the hoofs, drawing it back and forward until the foot bleeds freely; but should it be much swollen and likely to suppurate, apply a poultice until it be sufficiently ripe for opening with a lancet or pen-knife, afterwards keep the orifice clean, and anoint it with some healing ointment. This disease is sometimes occasioned by long driving on dirty roads, accompanied with a bruise in the heel or some other part of the foot. All that is necessary in this case is to keep the foot clean, and pare the top of the hoof until it bleed freely.

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of the ironmongers shops; every farmer who has cattle occasionally blown ought to have one of them.

* In prescribing recipes to accomplish the above-mentioned cures, I have selected the most simple where I was aware of their being equally efficacious, being more at the command of the public both with regard to convenience and expense. I have likewise in most cases annexed two or more to each disease, so that if one is not to be had or at hand, perhaps another may.

† When the disease proceeds from the above cause, a gentle dose of physic once a week for two or three times will greatly facilitate the cure.

WARBLES OR WORMS ON THE BACK.

These vermin are produced by a large fly, known by the name of gad-fly, depositing eggs on the animal's back.

Preventive.—Wash the animal's back two or three times during the warm months of summer, which will not only prevent the warbles from afterwards appearing, but likewise prevent cattle from being so much annoyed with these flies, which is so prejudicial to their improvement even while on the best pastures.

Cure.—Take off the scab which is generally upon the tumour, and pour into the small orifice (which will appear) a few drops of the spirit of turpentine; or the worm may be extracted by pressing the finger and thumb on each side of the tumour; the orifice may first be enlarged with a pen-knife, if found necessary.

LICE.

As it is almost invariably reduced poor subjects that are infested with these vermin, consequently good keep is the best preventive.

Cure.—Rub the animal all over with mercurial ointment, keeping it dry during the operation: one rubbing will in general prove sufficient. This is one of the most effectual cures, but it is attended with danger in case the animal should lick itself: this, however, may be prevented by tying it up in the house during the time of effecting a cure; or rub all the parts affected once a week with the ointment. (See p. 137.)

LOOSENESS OR SCOURING.

If the animal so affected is at grass, it must be put into a house and fed with dry food, which will in most cases effect a cure; but when the disease seems obstinate, first give a gentle dose of physic, and when it has done operating, give a quart of the grounds of port wine mixed with three or four ounces of finely pulverised chalk every other day for a week, or give drench, p. 139.

WOUNDS AND BRUISES.

The treatment necessary for these accidents incident to neat cattle being in every respect similar to that already described for such among horses, I shall therefore refer my reader to section v. on horses, p. 60.

I have now treated of such diseases and accidents incident to neat cattle as have hitherto come under my notice: many of my readers, who may very probably be much better veterinarians than I can have any pretensions to,* may say that I have omitted many diseases or accidents, and have handled those I have taken notice of very imperfectly. As to the former, I am well aware of having both read and heard of various diseases which I have here overlooked, merely because I was not acquainted with them; and as to the latter I am likewise aware of my inability of expressing myself in a manner suitable to the taste of a refined reader or veterinarian: but as my object has been, during the time of writing on this subject, carefully to avoid the insertion of any thing which I have not witnessed to have been successfully reduced to practice, I trust that the preventives and cures annexed to the different diseases mentioned in the preceding pages, when properly and timeously applied, will, in most instances, prove effectual; and that the symptoms therein described peculiar to each disease will prove a great assistant in "putting the saddle on the right horse."

SECTION VII.

REMARKS TO PURCHASERS.

I MIGHT here swell out this section and add similar ones with suitable remarks, concluding the two subsequent chapters, relative to the purchasing of the different kinds of stock spoken of in each; but from what has been already stated in the introductory and general remarks in such chapters, with the symptoms of the various diseases noticed therein, together with the general remarks on breeding, chap. v. I trust that the purchaser will not only be prepared when he goes to market to readily discriminate the kind of stock he is in want of, but to select the most suitable of that kind free from all disease. But as every possible means is in general used by cattle-dealers in showing off their stock to the best advantage, in like manner ought every grazier to be upon his guard in order not to be misled or deceived by the art or plausibility of an acute cattle-dealer. The following hints may therefore be of some service to the young or inexperienced purchaser in preventing him from swallowing all, or at least the most pernicious baits that are too frequently laid for him. A purchaser going into a market with the above remarks strongly imprinted in his mind, and examining minutely all the stock and learning the prices, &c.* will soon (if he has any discrimination at all) discover where he ought to direct his attention. But notwithstanding that he may be satisfied as to the particular lot which he has fixed upon being healthy, sound, and suitable for his intended purpose,† yet he may be much deceived as to the market price of that lot by the manœuvres of the exposer, it being common by most of dealers (that pretend to be up to their business) to show their stock as much upon elevated ground as possible, and when a purchaser is examining them, he is in general by some means or other kept upon the low side, by the dealer directing his attention to some one in that quarter, or the servants being taught to turn the cattle always to higher ground, or keep them moving round in a raised state, which not only makes them appear larger and more healthy, but prevents the purchaser from discerning the inequality of the stock, as the worst or smallest animals are mostly kept in the centre. Having, however, examined the stock as minutely as possible (in opposition to the above method of showing) by going repeatedly round about and through among them, cause the cattle to be walked slowly past you one by one, by which means all inequalities will be more readily perceived, and the stock appear in their true colours. If a few inferior ones are to be turned out of the lot, this may be done by putting out the worst first, and so on until the number is completed; but when one half or one third of a lot is to be rejected, it will then be better to take out such as are wanted from the lot, taking the best first, until the rejected number is left.

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* It must be remembered that I am neither a professed horse doctor nor 'cow leech.'

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* The above particulars are also necessary when exposing stock for sale, especially by those not in the habit of constantly attending markets, as it is in general attended with the best consequences to ask no more for cattle than a market price.

† The most suitable stock, of whatever kind, can only be composed of animals of an equal size and age, reared or bred upon the same farm, or a similar soil and climate, but inferior to that intended for them. The concomitant symptoms of bad health, &c. are a drooping head and ears, or a raised back, light belly, a staring dry coat, a hard skin adhering close to the flesh. Such external appearances are either the effects of a present disease, the seeds of an approaching, or fragments of a former one. If a sheep stock, see indications of health, chapter iii. and end of section ii.

CHAPTER III.

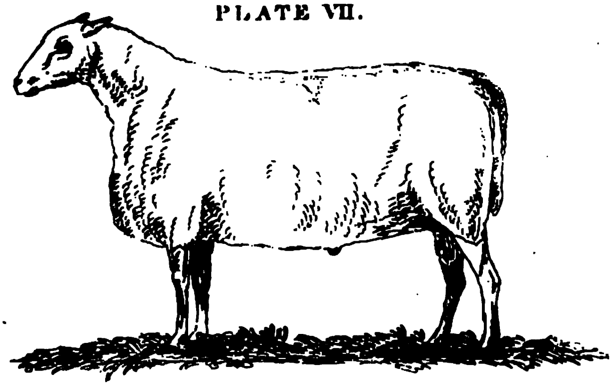
SHEEP.

SECTION I.

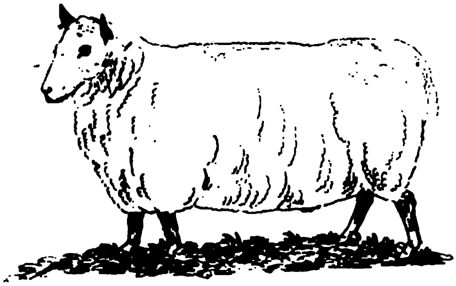
INTRODUCTORY REMARKS.

Sheep may justly be considered animals of still greater and of more general importance to the community than either of the two valuable species of animals already taken notice of—every individual from the king to the beggar being more or less interested about them, particularly

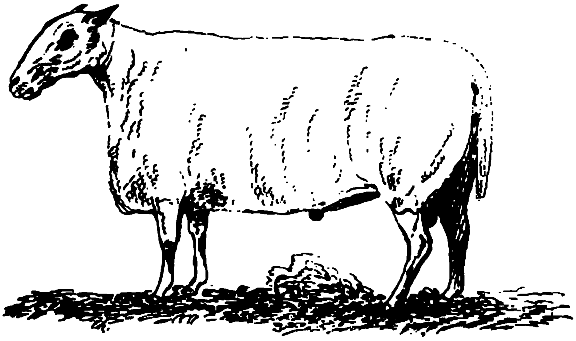
PLATE VII.



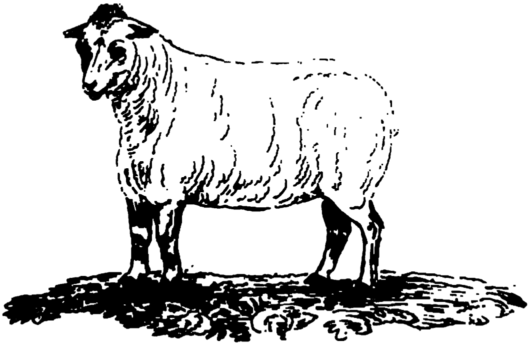
Dishley or new Leicester Breed



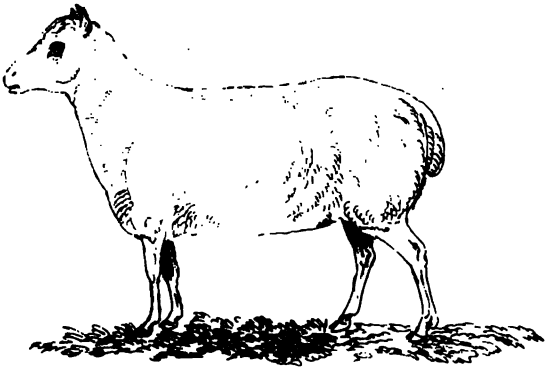
Dishley or new Leicester Breed



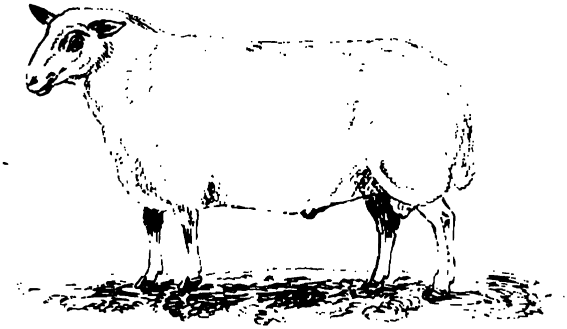
Tees-Water improved Breed



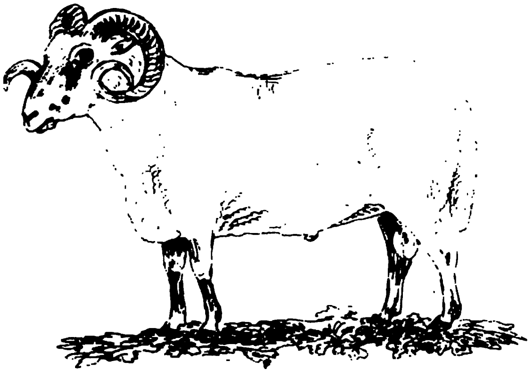
South Down Breed.



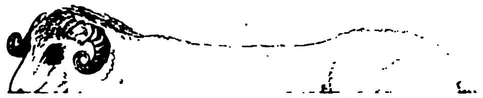
Hereford or Ryeland Breed



Cheviot Breed



Heath Short or Forest Breed.



their external produce,* which affords covering to all mankind, and employment and support to so many thousands of people. From some species of them being calculated to live upon land where other animals of general use would starve, what a large portion of the globe, already inhabited, do they then render of considerable value, which would otherwise be almost entirely waste. Seeing, therefore, that we have an animal possessing such superior advantages, it ought consequently to become a more general exertion among men, in endeavouring to discover and encourage every thing that might have the least tendency to promote an improvement in the management of them. Sheep are most commonly denominated by the long and short wooled breed; yet the different breeds and varieties of them are equally numerous to those of neat cattle, all of which vary less or more in quality and appearance according to the difference of soil and climate in which they are reared, and are generally named after the district or county to which each kind may be most peculiar. But for such of my readers as may not be able to distinguish from appearance the different kinds, and are not aware of the advantages or disadvantages attached to each, I have endeavoured to insert in the following *Synopsis* most of the original distinct breeds, with such characteristic marks, and other particulars, as I trust will not only greatly assist them in discriminating one kind from another, but enable them to determine upon that stock best calculated for the particular situation in which they may be placed.

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* It may not be unworthy of remark, the small proportion of people who are judges of sheep and their proper management when alive, to those who are judges of the proper manufacturing of their covering and carcass when dead; and I am sorry to add, that although great improvement has been made by Mr. Bakewell and some of his followers on certain species of this stock, yet such improvements have not extended to some other kinds equally valuable, and become so general as to keep pace with those made upon the manufactory of part of the produce of these animals.

Synopsis of the different Breeds of Sheep in Great Britain.

BREED.	CHARACTERISTIC MARKS.			PECULIAR ADVANTAGES OR DISADVANTAGES.								WHERE TO BE FOUND.
nt Horns.	*Colour.*	*Kind of Wool.*	*Size and Shape of Carcass.*	*Quality of Mutton.*	*Aptitude to fatten.*	*Constitution.*	*Pasture and Climate suitable.*	*Weight of Fleece.*	*Price of Wool per lb. 1791.*	*Weight of Wethers per qr.*	*Years old when ready for killing or at maturity*	
								lbs.	s. d.	lbs.	years.	
hley, or New eicester.......	White face and legs.	Long, medium quality.	Handsome barrel shape.	Medium, fat not well mixed.	Quick.	Medium.	Inferior pasture, good climate.	8	0 10	25	2	Leicestershire, and the neighbouring counties.
Lincolnshire.....	Do. do.	Very long, and coarse.	Large and coarse.	Coarse grained.	Slow.	Delicate.	Rich pasture, good climate.	11	0 10	25	3	Lincolnshire, and other rich counties.
Tees-water........	Do. do. Some grey faces and legs.	Do. do.	Do. do.	Do.	Do.	Do.	Do. do.	9	0 10	30	2	Yorkshire.
Dartmoor, or Devonshire Natts..........	White faces and legs.	Do. do.	Do. do.	Do.	Do.	Medium.	Coarse pasture, good climate.	9	0 8	30	2½	Devonshire-moors.
South Down.....	Grey faces and legs.	Very fine, and short.	Fine bone, but unshapely light fore quarters.	Fine grained, well flavoured.	Quick.	Do.	Inferior pasture, good climate.	2½	2 0	18	2	Downs of Sussex.
Herefordshire or Ryelands...	White faces and legs.	Do. do. growing close to the eyes.	Small and handsome.	Do. do.	Medium.	Delicate.	Do. do.	2	2 9	14	4½	Herefordshire.
Romney Marsh.	Do. do.	Long and fine.	Coarse bone, but well shaped.	Do. do.	Quick.	Medium.	Rich pasture, good climate.	8	0 10	25	2½	Romney Marsh, and the rich marsh lands of Sussex.
Herdwick.........	Speckled black and white faces and legs.	Short and matted, rather coarse.	Small and fine bone.	Do. do.	Medium.	Hardy.	Inferior pasture, medium climate.	2	0 6	10	4½	Cumberland.
Cheviot...........	White faces and legs.	Mostly fine and short, some parts coarse.	Fine bone. light fore quarters.	Do. do.	Quick.	Do.	Inferior pasture and climate.	3	0 11	16	4½	Cheviot Hills.
Dun-faced........	Dun faces and legs.	Short and fine. with various shades of colour.	Small, rather handsome, and very short tails.	Very fine, and excellent flavour.	Do.	Do.	Do. do.	1½	3 0	7	4½	North of Scotland, in various parts.
Shetland..........	Various colours.	Short and fine, some very coarse.	Small bone.	Do. do.	Do.	Very hardy.	Inferior pasture, and cold climate.	1½	3 0	8	4½	Shetland Islands.
With Horns.												
Exmoor	White faces and legs.	Long and fine.	Fine bone, but bad shape.	Fine grained, and well flavoured.	Do.	Hardy.	Inferior pasture, and medium climate.	6	0 8	16	2½	Exmoor, in the northern extremity of Devonshire.
Dorsetshire (very small horns.)	Do. do.	Short and fine.	Thin shape, and long small legs.	Do. do.	Medium.	Medium.	Medium pasture, good climate.	3½	1 2	18	3½	Dorsetshire.
Norfolk, (large horns.)..........	Black and grey faces and legs.	Do. do.	Do. do.	Do. do.	Do.	Do.	Inferior pasture, medium climate.	2	1 5	18	3½	Norfolk and Suffolk.
Heath, Short, or Forest, do..	Do. do.	Long and coarse.	Small and short shaped.	Do. do.	Quick.	Very hardy.	Inferior pasture, and cold climate.	3½	0 6	15	4½	North-west counties of England, and the west of

Although the different kinds of sheep noticed in the preceding table may be denominated distinct breeds, yet they chiefly consist of a few original ones, with their varieties, (many of whom, of less note, I have not inserted in the synopsis,) such as the Lincolnshire, and its variety, as marked in the table. But to attempt to trace out a true origin of each would be endless and unavailing, therefore let it suffice for the present, to make a few additional remarks upon peculiarities attached to such different breeds as are most approved of, and are likely to become and continue to be of the most general utility. Those kinds which have engrossed the attention of the public most, both in point of improving them, and being, and still continuing to be the subject of dispute, as to which is most profitable, are the Dishley, South Down, and Hereford, Cheviot, Heath, and Merino, all of which have their most strenuous advocates, and in reading or hearing the plausible reasonings of each in behalf of their favourite stock, it would appear difficult for many to determine which kind is most profitable; but to one at all experienced in the management of different breeds of sheep in different situations, it must appear quite evident that most of them possess their several advantages, and that the situation calculated to rear, improve, or fatten one kind, may rear, but will speedily starve or diminish the quality of another. In giving a farther illustration of the different breeds of sheep already noticed, I shall chiefly confine my attention to those last mentioned, and briefly notice such singularities as may be attached to some others mentioned in the synopsis.

DISHLEY, OR NEW LEICESTER BREED.

In addition to the above names, this breed is likewise known as the Bakewell breed, from the first selector of them being the late Mr. Robert Bakewell of Dishley in Leicestershire: hence the name of those sheep varies from that of their first owner to his place of abode, and the county in which it was situated. This breed of sheep being now so generally known, it might be thought superfluous for me to enlarge in giving a further description of them, for those who do not know them from experience, most probably may from revising the different authors on live stock,* where they are highly approved of by most, although utterly condemned by others. Having had considerable experience in the management of this stock upon a very extensive scale, both in the superintendence of large stocks kept by my father, and afterwards on my own account, I can with more confidence state particulars relating to them.

Being a variety of the Lincolnshire breed, they may be said still to retain a resemblance of their parent race, in respect to the quality of mutton and wool,† but may be easily distinguished from them and all the other long wooled breeds, from their large lively eyes, fine heads, transparent ears, and straight compact carcass, supported by small clean bones. The object of the first spirited breeders of this stock in Leicestershire, was to produce an animal giving the least offal and most mutton in the shortest period, from a given portion of food. In these particulars, I have invariably found and observed the Dishley breed to excel all others, in situations to which they were peculiarly adapted; and, as Mr. Culley very justly observes, " this point being gained, a new field opens to the experimental rural philosopher, to cover these good carcasses with the most valuable fleeces." It is here where I conceive the principal defect of this breed is centred; and should an argument be at all commenced in favour of some of the other long wooled breeds, it can only be supported by adverting to the superiority of the weight of the fleece; for I am persuaded that all unprejudiced breeders of the Dishley breed will agree with me in stating, that the nearer that this breed arrives at perfection, in point of what is called true shapes, indicating quick feeding, as above, the greater will be the deficiency of wool, particularly on their backs and bellies, which are not unfrequently on the aged ewes almost bare. But I must agree with the above breeders alluded to, who I know will be ready to say, that such deficiency is more than doubly overbalanced by their propensity to get quickly fat, and that at an early age; as a proof of which, I have frequently had two years old wethers, and ewes after suckling their lambs, killed the following autumn and winter, weighing upwards of 20 lbs. per quarter, and cutting from three to three and a half inches of solid fat upon the rib, * and from two to three inches all along the back from head to tail. Such instances as already quoted are rarely to be met with in any other breed of sheep; but the greatest superiority of this breed consists in being always in readiness for a market, and getting fat † upon land ‡ that would merely keep in the life of some of the larger breeds, and do little more than support even some of the smaller ones.§ In short, I consider this breed (after minutely weighing every circumstance both for and against it) to be infinitely su-

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* In Mr. Culley's Treatise on Live Stock, I conceive a very just statement to be given of them, as far as my experience and observation has enabled me to discover; but it must be remembered that authors, as well as other people, have their hobbies, (which are sometimes out-ridden) and the above-mentioned sheep being Mr. Culley's, a little allowance must therefore be given, should he have overstrained the mark in some particulars.

† Although the quality of each may be somewhat superior, yet it is not so perceivable to the generality of purchasers as to have made any variation in the prices per lb.

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* Such mutton as the above mentioned is, however, not calculated to grace the table of an epicure, or those with delicate appetites, but is exceedingly profitable to the poor or labouring classes of people, who generally make use of the fattest parts in stewing potatoes, frying fish, and many other similar purposes; it is however most readily devoured by some true Englishmen (or in manufacturing counties) in the usual mode of preparation, viz. roast and boil.

† Such is the propensity of the above breed to become and remain fat, that it is frequently necessary for ewes, even after suckling two lambs, to be put upon poor pastures in order to reduce them, before coupling again with the ram: this is also necessary prior to the lambing season.

‡ The lands above alluded to are such as do not produce luxuriant herbage, nor of a fine quality, but are well sheltered and in a good climate; for I have frequently observed, when the Dishley breed and some of the larger kinds were grazing together upon such land as was fully competent for feeding the latter, that the difference was trifling, and, if candidly calculated, would turn out in favour of the larger breeds.

§ The above assertion may be more particularly applied to the smaller breeds (such as the Cheviot and black-faced, &c.) when in confined situations or small inclosures, whose disposition to ramble prevents them from settling to feed.

perior to all others, in point of profit, for grazing in medium or inferior pastures, situated in a good climate; but, like all others of the same indolent nature, they require a supply of succulent food during a stormy winter. Such superiority is however not to be wondered at, when reflecting upon the unwearied attention and enormous expense bestowed on the improvement of this particular breed, by Messrs. Bakewell and Culley and their spirited followers; but supposing the same trouble to be bestowed upon some other breeds at a much easier expense, might they not prove equally superior to their original race? Reason dictates, and faint attempts prove that they would. It is therefore to be hoped and expected, as prejudices get more and more extirpated, that improvements will more and more increase; and that the period is on the wing, when the fame of some short wool breeder will sound as much in the public ear as Bakewell's has done for the improvement of the long wool sheep. The Dishley breed have generally two lambs at a birth; but one third of a large stock having twins may be considered as an average of their produce.

TEES-WATER.

This breed is the only other long-wooled one that demands our further notice, and is among the heaviest of the species,* likewise more compact, better shaped, and finer of the bone and quality of mutton, than any other equal to them in weight. These sheep are next in repute to the Dishleys, and answer well to cross them with, † but like all other animals of a large mould, require good land, well sheltered, and a little nursing in winter with succulent food. They are very prolific, having mostly two and sometimes three lambs at once; even instances have occurred of four or five being produced at one birth.*

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* Mr. Culley (in his Treatise on Live Stock, p. 122) quotes an instance of a Tees-water wether weighing 17 st. 11 lbs. at 14 lbs. to the stone.

† At one period finding my Leicester stock getting too fine, losing weight both of mutton and wool, I purchased a Tees-water ram, which, coupling with his own offspring, once put me in possession (in a few years thereafter) of a stock which fed equally quick to my old one, and yielded from a third to a fourth more of both mutton and wool, which brought an equal price per [illegible]; and I kept the same number upon an acre as formerly.

SOUTH DOWN BREED.

These sheep derive their name from being principally reared upon the dry chalky downs in Sussex: they seem to possess the advantage of fine wool, and fattening at an early age, being frequently fed off at 18 months; and upon light dry land in a good climate, they are found to answer well. One third of the ewes (in a stock well kept) will, in general, produce twin lambs; although the mutton and wool are of a superior quality, they are produced from a very unshapely carcass; but such qualities, together with their hardy, vigorous constitution, will still render them a stock worthy of general notice, and an object of improvement,† for dry poor pastures in a good climate. They have been great rivals to the Dishleys, and are even more approved of by many.‡

HEREFORDS, OR RYELANDS.

This breed derives the former of these names from being peculiar to Herefordshire; and the latter from being kept principally upon a tract of very poor land, though more capable of producing rye than any other kind of grain. These sheep are remarkable for very fine wool, so much so as to rival that imported from Spain; they are likewise noted for being patient of hunger, and subsisting on less food than most other breeds; yet they are so tender in their constitution as to require shelter in winter, consequently they are found more profitable than any other kind upon bare pastures in a good climate. The above qualities, and their compact carcasses, render them very desirable for coupling with some other kinds, so as to produce a profitable stock for some situations.*

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* Mr. Edward Eddison's ewe, when two years old, brought him four lambs, and the third year five, the fourth two, the fifth five, the sixth two, and the seventh two lambs. N. B.—The first nine lambs were lambed within eleven months. (See Culley on Live Stock, p. 123.)

† The above breed of sheep have been much improved by Mr. Elman of Glynd, Sussex. Lord Somerville and Mr. Tollett of Staffordshire have likewise made an improvement by a cross with the Merino (or Spanish) breed about sixteen years ago, when ewes of this breed were sold at Holkham sheep-show at from five to eight guineas each, and tups hired at from thirty to forty guineas the season.

‡ Mr. Coke of Holkham, Norfolk, after a trial of thirteen years, gave a decided preference to the South Downs, by giving up his Leicesters altogether, although in many respects great favourites.

CHEVIOT BREED.

This breed has acquired the name from originally occupying the Cheviot hills, (a mountainous tract forming part of the northern boundary of England,) but has of late been introduced into various parts, even the most northern of Scotland, where they have rivalled the black-faced, or heath breed; and in some situations have gained ground upon them, while they have lost it in others.† The pure breed have white faces and legs, clean small bones, lively and prominent eyes, long bodies, light in the fore quarters, thin pelts, covered partly with fine and partly with coarse wool, each being distinctively separated previous to its being manufactured. Although I have stated in the preceding table that this breed of sheep is not ready for killing until four and a half years old, and the average weight of wedders at that age is 16 lbs. per quarter; yet they are susceptible of being fed at a much earlier age, and brought to a greater weight; which has been repeatedly and satisfactorily ascertained. I shall here refer my reader to an experiment made in 1803 and 1804, by a committee of the Cheviot society, who selected a few lambs, part of which was killed when little more than one year and a half old, which weighed from 20 lbs. to 21½ lbs. per quarter, and tallowed from 13 lbs. to 14 lbs. each; and the remainder were killed when about two and 1-4th years old, which weighed from 25 lbs. to 28 lbs. per quarter; one of them yielded 18 lbs. of tallow. Various attempts have been made at improving this breed by coupling the ewes with other rams, viz. the Leicester and others;* but in order to retain the quality of the wool, mutton, and constitution of the Cheviots, (which no other kind equally possesses that is calculated for mountainous situations,) I should apprehend that the greatest improvement still remains to be made by breeding from the best of their own kind,† particularly if they are intended to continue rivals for the mountainous districts; on the propriety of which I shall venture an opinion in the chapter on the management of grazing farms.

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* About thirty years ago, Dr. Parry of Bath commenced crossing Ryeland ewes with Merino rams from his late Majesty's flock, as also from that of Lord Somerville, and this cross was likewise followed up by his Lordship and many others; and as a proof of the superiority of the wool produced by this cross, both of the above gentlemen repeatedly were honoured with the premiums of the Bath and West of England Society.

† The situations in which the Cheviots have excelled the black-faced breed are partially, if not wholly, covered with green herbage: however opinions still seem to vary as to this point; but as far as my experience and discernment has allowed me to judge, I would still give a preference to the black-faced breed, where heath is the most predominant covering, and the winter severe and exposed.

SHETLAND BREED.

These sheep derive their names from the Shetland Islands, where they are chiefly reared. They are a hardy race, but too wild to be grazed in confined situations. There are two varieties of this breed, the one having fine cotton fleeces, short and open, while the others have coarse wool above and fine below, likewise supplied with long hairs, termed *fors* and *scudda* (in Shetland,) which protects the animals from the intense cold of winter. The former of these species is not so hardy as the latter, and seems to be a variety of the dun-faced breed, the original of the Highlands, which are now too insignificant for farther illustration, although few or none excel them in quality of mutton.

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* I have frequently bought draught ewes of the Cheviot breed in the latter end of autumn, put them to Dishley rams, and sold them and their produce to the butcher next summer to great advantage. From the lambs having the propensity of their father's progeny, and their mothers being generally superior milkers, they are soon ready for a market. This system is much admired and still continued in situations where it would not be eligible to keep a regular stock of sheep.

† In selecting the best a preference ought to be given to those with the heaviest fore-quarters, although a little defective in other points, as it is in this particular that the Cheviot sheep are still most deficient.

DORSETSHIRE BREED.

This breed has mostly small horns, a long thin carcass covered with fine short wool, and supported by long small legs. The ewes are singularly prolific, bring lambs twice and at any time in the year, which has rendered them a useful stock for supplying the luxurious tables at unseasonable periods.* This singular prolificness is accounted for by the ewes conceiving again the first week after lambing, (if put to the ram) which, in former days, was ascribed more to the mode of treatment than the nature of the animal, as it was then supposed that this breed would only produce early lambs in Dorsetshire and the neighbourhood, owing either to a custom in that country of driving the ewes about until they become quite heated, and then turning them to the ram, or from some particular herbage produced from the Dorsetshire downs. However, since this breed of sheep has found its way into various parts of the kingdom where no artificial means is used, nor the herbage of the Dorsetshire downs can have effect, it would appear that such early and frequent lambing is produced more from the nature of the sheep than from any other cause whatever.

HEATH, SHORT, OR FOREST BREED.

Such are the variety of names given to the same breed from their being calculated to thrive on heathy grounds and forests, and from the compactness and shortness of their carcass. They are more commonly known (particularly in Scotland) as the black-faced breed. They are a hardy, active race, covered with long, coarse, open, shaggy wool; they have a fierce, wild-looking eye, and are much inclined to ramble. From their particularly hardy constitution, and activity, they are better calculated for exposed (and inaccessible) high situations, than any other breed, particularly if heath or heather be the predominant covering. This hardy race were formerly only to be met with in the north-west of Yorkshire, Westmoreland, and Cumberland, but are now spread over most of the mountainous districts in Scotland, having now nearly extirpated the dun-faced original highlander altogether. Although this breed produces the coarsest wool, yet it excels all others, the old dun-faced excepted, in supplying our tables with the finest quality of mutton, reared from land incapable of being turned to any other account, not being susceptible of supporting any other living creature of the least value, the goat and moor-fowl excepted.

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* Various markets in England, and likewise the Edinburgh market, have for many years past been supplied with Christmas house-lamb from the Dorshire breed of sheep.

MERINO, OR SPANISH BREED.

Although this breed of sheep is principally horned, yet the ewes are sometimes without them. They are very defective in shape, having a piece of loose skin hanging down from their throats, accompanied with a hollow in the neck, which, to the eye of an admirer of symmetry, is very offensive, although much admired in Spain, where it is said to denote a heavy fleece of a superior quality. The wool of this breed is particularly fine, and the best fleeces have a dark brown tinge upon them, occasioned by the dust adhering to the greasy particles of its pile. The Merino sheep are natives of Spain, and were first introduced into England in the year 1787; and in 1792 measures were taken, both by his late Majesty and the Right Honourable Lord Somerville and others, to improve the native breeds of sheep by crossing with Spanish rams,* many of which experiments succeeded in improving the wool, while they were accompanied by such defects both in shape and constitution, as to check their general prosecution.

From the preceding description of the various breeds of sheep noticed, it will appear that each kind varies materially in point of symmetry. This, however, proceeds more from some of them being highly improved (while others remain in their original form) than from one species being more perfect in its nature than another; for in attempting to arrive at perfection, in any breed of sheep, the nearer that they can be brought to the following description the better.

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* The most successful cross was that (already noticed) made by Dr. Parry of Bath, between the Spanish ram and the true Ryeland or Hereford ewe.

REQUISITE SHAPES OF A RAM OR EWE.

The *head* should be rather long and fine, but small; *eyes* lively, prominent, and bold; *ears* of a medium length, thin, sharp at the extremities, and placed near each other; *crown of the head* narrow and fine; and the whole *head* should be free of long hairy wool, being finely covered with soft short hair; the *neck* should be fine where it joins the head, (having no loose skin hanging down) but increasing gradually until it join the breast and shoulders, where it should be thick and full; *shoulders* broad and full, joining gracefully to the neck forward, and chine backward, so as to leave no hollow in either place; *breast* broad, and projecting well forward; the *back* and *loins* broad, flat, and straight, from which the *ribs* should rise in a circular manner, forming a deep carcass, with a straight *belly; chest* or *girth* full and deep, as likewise the *twist*, or junction of the inside of the thighs; the *arms* and *thighs* well covered with mutton quite down to the knees and houghs; the *quarters* long and full. This description of the carcass should be covered with a thin *pelt*, closely set with fine soft *wool*, and supported by small upright *legs*, being covered with short soft hair, and free from superfluous skin. In short, the whole carcass should form a compact-like appearance, having all such parts as are termed offal as fine and small as the size of the animal will proportionably admit, and all the useful parts well covered with mutton, beset regularly with fine wool of a close texture.*

In the selecting of a ram corresponding as above, although it is desirable to have him fine in all points, (which might give him an effeminate appearance,) yet it is requisite that he should have as robust and masculine an appearance as possible, without the least approach to coarseness.

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* The kind of wool above alluded to, is that which forms a solid body firm enough to prevent the rain from penetrating to the skin, but easily divided into 'salving rows.' The matted fleece, (such as can scarcely be torn asunder) and the open hairy one which will not hang together, ought both carefully to be avoided in the choice of sheep; for although the latter generally covers a good thriving carcass, yet the defect in the quality of the wool is too great to be overlooked, particularly in a breeding stock.

SECTION II.

GENERAL REMARKS

On the soil and climate best adapted for each Breed, and the Markets for which they are best calculated, with additional hints for selecting a proper Stock.

When referring to the introductory view already given, and particulaly the table of *Synopsis*, I trust it will not only greatly assist the inexperienced grazier in the quick discernment of one breed of sheep from another, (in order to check imposition when he is going to purchase,) but likewise in selecting the most suitable stock for the climate and herbage which his particular situation may possess, always keeping in view that when two or more kinds answer the same situation, to give preference to that kind which produces the quality of mutton and wool most saleable in the intended market. And should it be found expedient to effect a change of stock, from that which is the most saleable, not the most profitable, if an equal demand could be obtained; let such be tried by degrees, as it is too speculative for one individual to attempt all at once to remove a prejudice of an old standing, or a whim of fashion in the height of its glory.

Although the different species already noticed are numerous, and vary as much in some particulars as the herbage and situation to which each kind is best adapted, yet they are in a general point of view distinguished by the long and short wooled, and horned or polled breed; but the different varieties of each require different pastures in the same climate, (particularly a breeding stock,*) as may be observed by the synopsis, where I have endeavoured, as near as possible, to place each kind upon such soil as they will pay best when taking the value of the land into account: for although some of the breeds which are allotted for the inferior pastures might still do better upon some of the superior ones, yet other breeds will pay better, consequently ought to have the preference. When taking a general view of the soil and climate, market and manufactories, most suitable for each kind and their variety, it will be found that the largest long-wooled breeds, such as the Lincoln, Tees-water, &c. are best adapted for rich inclosed lands in a good climate, their mutton for markets in manufacturing districts, and wool for the finest worsted manufactories; the smaller long-wooled breeds, such as the Leicester, &c. for the medium or inferior pastures in a good climate, their mutton for markets in manufacturing districts, and wool for the coarsest sorts of worsted and other manufactories. The middle-wooled breeds, such as Southdown, Cheviot, &c. are most suitable for superior hilly pastures, or inferior inclosures in a medium or inferior climate; and their wool for manufacturing into cloth of a medium quality; mutton suitable for any market. The finest wooled breeds, such as the Merino, Ryeland, &c. for the inferior inclosed pasture in a good climate, wool manufactured into the finest cloth, and mutton saleable in every market. The short coarse-wooled breeds, such as the heath or forest breed, and its variety, are best calculated for wet, exposed, hilly districts covered with heath alone or something similar, their wool for the coarsest sort of worsted manufactories, and the superior quality of their mutton makes it in great request in every market; but more so when surrounded with epicures than with coal-heavers. The time most approved of for selecting a sheep stock is a little before shearing, when the quantity and quality of the wool may be fully ascertained. But when circumstances will admit, a preference should be given to first examining in the above state, and immediately after being stripped of their covering, before making a purchase, for a good coat sometimes covers other great defects. It would be further advisable to examine several flocks in this manner, making remarks thereon, and after comparing notes, give a preference to the stock nearest perfection, with wool and shapes combined. The customary age for selecting a breeding stock, is either when hogs or old draught ewes, these being the periods when the greatest choice can be had, and procured at the easiest expense; but I would give a decided preference to the latter, for if the ewes are not too old, their offspring will be superior for at least the first year. It ought, however, to be observed, that the draught ewes purchased are not too old, and that the lot consists of different ages, so that they may again stand draughting, as their offspring may become ready to supply their place; consequently the oldest of them should have lambs two seasons before they are sold. As it is of the utmost importance to begin with a healthy stock, the indications of such are, lively dry eyes, red gums, white firm teeth, sweet breath, cold feet, clear, oily, red skin, wool firm, perspiration regular, and excrement of a natural smell and firmness: ceasing to chew the cud is a sure symptom of some approaching disease.

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* The rich pasture requisite for the Lincoln, Tees-water, and other large breeds, would make the Leicester breed too fat for breeding, while the inferior pasture suitable for them would not keep the others fat enough for that purpose.

SECTION III.

MANAGEMENT.

From the activity and constitution of sheep in general, this department may almost be said to be completed when a pure healthy breed of any kind is selected and placed at their proper homes; but there are many other particulars indispensably requisite to complete the full and proper management of this stock, which, if neglected, may erroneously make the grazier apprehend that he has made an improper selection for his particular situation, or that such a selection will be very far deficient in reimbursing him for the trouble and expense which he has bestowed upon them. It is in the neglect of such particulars that so many of our gentlemen graziers are so much disappointed in their views,* and so many valuable kinds of stock are "cried down" for not being answerable to a certain soil or climate, which perhaps is the only one for which they were destined by nature. Although the annual returns from this stock, like all others, will vary very materially according to management, yet this process among sheep is trifling and easy when compared with that necessary for most other kinds of stock, the purposes for which they are destined, and modes of feeding, not being so numerous; the hardiness and superior activity which commence at their birth, and continue throughout the different stages of life, make them much less dependent on the assistance of man than any other species of animal of equal utility. But seeing that no kind of domesticated stock answers to be left entirely to themselves, I shall therefore proceed to point out the necessary attention which ought to be bestowed upon this species of stock, for its ease and cheapness do not render it less requisite and profitable. The management of a sheep stock necessary to be discussed in this chapter, may be comprised in the following heads, viz. breeding, rearing, smearing or salving, and shearing; with the symptoms, causes, preventives, and cures for the most prevailing diseases: on the discussion of which, I shall pursue a plan somewhat similar to that already done in the management of neat cattle, which will be found to vary very little in some respects, although materially in others.

BREEDING.

From a due attention having been paid to all the particulars mentioned in the introductory view and general remarks, I trust that the breeder is now enabled to select males and females of proper shapes, and such as are best calculated for his particular situation; after which, he must put them together at a proper season,* and in good condition for propagation,† so that the offspring may arrive at the commencement of the grass: but, before doing so, the rams ought to be carefully examined,‡ to see if they are clean in the skin, and free from all disease whatever. The rams having been among the ewes for about a month or six weeks, ought then to be separated from them, after which the ewes should be treated with tenderness, and pastured upon dry healthy ground, being disturbed as little as possible. A certain portion of healthy grass should be preserved for the yeaning season, upon which the ewes may be turned a few weeks prior to that period, particularly if they are in bad condition; but in situations where turnips can be raised, a few of those roots should always be reserved until the spring, and given to the ewes which may have lambed, in some sheltered situation. By feeding them well at this season the milk will be increased, and consequently the growth of the lambs, which, if checked at such a period, will render future nursing indispensable, and not unfrequently ineffectual in bringing them to any thing like what they would have been had they not received so early a stint. I should conceive it almost unnecessary to remind the shepherd (at least one who knows his business) of the attention requisite to ewes in a pregnant and lambing state. In the former, he ought carefully to examine them at least every morning and evening; and, in the latter, he should scarcely ever be from among them,[*] for it frequently happens, particularly in a cold dry spring, that ewes will require some assistance when in this state,[†] which, if not timeously given, is attended with much injury to the ewes, and a deficiency of lambs. It likewise sometimes happens that lambs when yeaned are apparently lifeless, in which case it will be proper to blow into the mouth and nostrils; a simple expedient, which has been the means of saving many. The lambing season being over, and taking it for granted that the ewes and their offspring are all in a healthy, thriving state, the shepherd may now take a sound sleep, never however forgetting to watch the movements of Reynard, or similar enemies to a sheep stock, late and early; consequently the shepherd's soundest sleep should be about noon.

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* Similar disappointments would attend the agriculturist even were he in possession of the best of soil in a superior climate, and be at the trouble and expense of selecting the purest and best of seed, and putting the land into the highest state of culture for its reception; for were he then to continue for a number of years merely applying the same seed to the soil, without any further attention to system or management, would not the luxuriance of the crop and quality of the seed annually degenerate?

For a further explanation of the cause of such a disappointment as above, see Management of Neat Cattle, p. 101.

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* The season will vary considerably, owing to soil, climate, and situation; but, allowing the months of March and April to be the commencement of the grass, the rams must be put to the ewes in October or November.

† It is absolutely necessary that both sexes should be in good condition, although not fat, in order to make them cohabit in proper time;—when there is a deficiency in this respect, artificial means are frequently used, as has been already noticed in the description of the Dorsetshire breed of sheep; such means, however, are highly improper, and will never be found necessary when ewes are in the above state recommended. It is common, and not altogether unnecessary, among the broad tailed breeds, to clip the ewes tails quite bare previous to the rams being put among them.

‡ One ram is found sufficient for 80 or even 100 ewes; but this must be partly regulated by the kind of sheep and age of the ram: never more than 50 ewes ought to be allowed for a young ram, or one very heavy or indolent from fatness: from 60 to 70 may be a suitable average number, as it is much better to have one ram too many than one too few; for a deficiency of rams is too frequently the cause of a deficiency of lambs, and likewise a defect in the strength and beauty of the offspring. It is a common, and not altogether unnecessary practice, in some places, to rub the breast of the rams with 'keal,' ochre, or something similar, in order to ascertain when the ewes may all have conceived; but in large stocks, and where the winter is severe, it is much better to remove the rams at a given period, so as to have no late lambs, for it will be found more profitable to have a few 'yell' ewes than a number reduced by nursing lambs, which will not stand the winter.

REARING.

This department may be rendered easy, by constantly supplying the ewes with a sufficiency of food encouraging to their milking quality, and the lambs with a sufficiency of that suitable to their palate and digestion, and of a nourishing quality, after being weaned. Should any sickly or weakly symptoms appear upon either the ewe or her offspring, or appearance of unseasonable weather, they ought to be put into a house, or some shed, (kept for that purpose,) every night, and continued for fewer or more nights, as circumstances may require. It however very frequently happens, where large flocks of sheep are kept, that, notwithstanding the utmost care and attention having been paid, there are losses both of ewes and lambs, although more frequently the latter. When it so happens that the mother dies, and leaves a living lamb, and at or nearly the same time some other ewe may have lost her lamb, she may be made to nurse the lamb that has lost its mother; or this change of mothers ought to be effected when one ewe has lost her lamb, while another is nursing two, one of which may be put to the former ewe.* There are, however, some other indispensable particulars to be observed during the rearing of lambs, which, if not properly attended to, is likewise accompanied with considerable losses, viz. castrating and weaning. Opinion seems to differ as to the exact time for castrating lambs; I would, however, prefer from two to three weeks old to any other age; for, when much younger, they are in general too weak for the operation, and, if older, there is greater danger to be apprehended from inflammation and its effects. When a stock is large, it will therefore be necessary to perform this operation frequently during the season,† as it does not answer to let one lamb get too old from waiting till another is ready. Moist, moderately warm weather, is best adapted for performing this operation, which ought to be done in the morning, so that the lambs may occasionally be kept moving about throughout the day, so as to make them bleed freely, which will prevent festering and mortification. Should the weather be stormy, or the mornings or evenings inclined to frost, it would be prudent to keep the lambs in a fold, or some sheltered field or valley, for a night or two, to prevent bad effects which might otherwise ensue. It is common to cut the tails of lambs at the time of castrating; but I would prefer doing so some time after, as it is better for them to lose a little blood at separate times than too much at once. At the time of castrating, some lambs must be left entire,[*] to be reared for rams. It is necessary to leave more in this state than what may actually be wanted, in case of accident, or change of appearance, which is sometimes very considerable, (for the worse,) from the lamb to the yearling. The next most essential period of rearing is the weaning season, which is commonly about the end of June, or when the lambs are three months old; but this period may very properly be extended a month or longer, when the ewes are inclined to

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[*] Some breeds of sheep, and particularly the improved Leicester, and its variety, are very liable to be cast or thrown upon their backs, and if allowed to remain any time in this situation, will sustain much injury; which is not unfrequently the cause of the production of a dead lamb, and a much injured or dead mother. But when a ewe, from any cause whatever, 'slips' her lamb, she ought instantly to be removed from the flock, and not exposed to the inclemency of the weather.

[†] For the method of giving assistance and treatment afterwards, see that mmended for cows, p. 106.

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* From the quick discernment which ewes have, making them nurse a lamb not their own, sometimes becomes a very troublesome task, particularly if not done the first or second day after yeaning. The most successful method is to skin the ewe's own lamb, and put it upon the lamb which is to be nursed. Such parts of the lamb as cannot be properly covered with the skin, must be rubbed with the after-birth, if the lamb died in the yeaning; but, if older, rub with some of the entrails. Allow the lamb to be very hungry, and the ewe to be much in want of being milked; put them both into some confined place, such as a chest, where the ewe cannot turn round to hurt or examine the lamb too minutely. After having sucked a few times in this way, the ewe will get attached to it. They may be let out through the day, but always put into the chest or pen when the lamb wants to suck, and kept there a few nights until the ewe has taken with it, when it may be stripped of its coat of deception. It would be proper, whenever a lamb dies, that it should be skinned, and the skin kept for the above purpose; but, if too long kept, it will lose the effect.

† The castration is performed by one person holding up the lamb against his breast, with a fore and hind-foot in each hand, while the operator cuts off

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as much of the cod as freely to allow the end of the testicles to appear, by throwing back the remaining part of the cod. He then seizes the end of one testicle with his teeth, and pulls it, while he keeps thrusting the belly back with his hands, until the string of the testicle comes fully away: and, after removing the other testicle in like manner, the operation is complete. A large orifice is preferable to a small one, and pulling away the strings of the testicles preferable to cutting them, which is sometimes done. There is also another method of castrating the old rams, called 'twitching,' which is performed by tying a piece of waxed string round the cod, or between the testicles and the belly; the knot, when tied, being perfectly clear of both, and made so tight that, if the whole were cut off, no blood would come from the body: being thus properly corded for a short time, the testicles will lose all communication with the vital parts, when the whole may be cut or allowed to rot off. Cutting a little off the end of the cod will forward the operation, as the testicles will drop before the cod. The part twitched may be occasionally greased, and spirits of turpentine applied about the ligature.

[*] In making choice of tup-lambs, the mothers should be more looked to than the appearance of the lambs, seeing that they alter so much in rearing; but, when two ewes are equal in appearance, and in being good nurses, eference should then be given to the best looking lamb.

to be fat about the time of propagation, and not intended for sale: but, for whatever purpose the lambs are intended, they are much benefited by an extra month of sucking; for, if for sale, they will be in better condition than they could otherwise be made; and, if for keeping, they will be better calculated to endure the hardships of winter. But, upon poor soil and exposed winter situations, or when the ewes are intended for sale, the lambs cannot on any account receive such indulgence, as it would render the ewes unfit for sale, for propagating in proper season, or enduring the severities of a stormy winter. When the situation or nature of the stock requires that lambs should not be longer in being weaned than the end of June or beginning of July, such ewes as are nursing tup-lambs should be kept upon some superior inclosed pasture, and in consequence be enabled to retain their lambs a little longer without receiving any injury.

Such treatment would produce strong, healthy, vigorous tup-lambs, which must be followed up during all the stages of life by a continuance of partial superior feeding. But, whatever may be the situation or kind of sheep, I would invariably wean the lambs before the falling off of the grass, which is the kind of food best calculated for supporting them at a period when they are so liable to shrink and fall off.* When the weaning is delayed until the grass is upon the decline, the lambs must be put either upon inferior grass, turnip, rape, or similar food, when they are taken from the ewes, which contrast is too great for the young tender constitution to bear, without causing such a stint as time and the best of nursing will scarcely be able to eradicate. To obviate this evil, therefore, let the lambs be weaned before the grass has lost its nourishment; and, when they are taken from the ewes, † put them upon preserved good pasture, at some distance from their dams, and of a similar nature to that which they received when sucking, and when the grass is finished they may receive turnip, rape, or such other winter food as the kind of sheep may require, or situation afford. Should the stock of lambs be large, if circumstances would admit, it would be of great advantage to divide them into three lots, and dealt with in a similar manner in the distribution of food as has been already recommended for calves, (see page 116,) particularly if turnips are given; which have a similar effect upon lambs or hogs, to that upon calves or stirks.* Durring the first winter, the hogs should be grazed upon dry well-sheltered land, receiving a few turnips and a little hay, should the deficiency of grass, severity of the weather, or kind of sheep require them.† In the spring of the year, great caution is necessary in putting them upon fresh pasture, as they ought to have the supply increased as they seem to gain strength, or become accustomed to it; in short, the change of food ought to be effected by regular gradations upon any young or poor animal at any season, but more particularly in turning hogs the first spring to grass than at any other season. Similar treatment to the above during winter and summer, until the flock has been twice shorn, may be said to complete the rearing of sheep,‡ at which period they receive the name of rams, if entire; wethers, if castrated; and ewes, if females; and are then perfectly enabled to undergo any hardship of which the nature of their kind will admit.

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* From the lambs having been accustomed to grass while following their dams, it does not affect the state of their bodies so much when weaned, as when both losing the milk and being put upon a change of other food likewise.

† At the above season, some kind of sheep, upon rich land, will require to be milked a little every other day, for two or three times, until the milk leaves them.

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* It may be observed, when hogs are fed indiscriminately upon turnips, that frequently great numbers of them die of inflammation, from being too full of blood, as it is always those in the best condition which are seized, as is likewise the case among young neat cattle. A few turnips are, however, a good preventive for the disease called the sickness, by keeping the body open.

† Sheep of an indolent soft nature are so much affected by cold stormy weather, as to shrink from the blast in some sheltered situation, and there remain until they almost starve before they will set out for a fresh supply of food, although perhaps it is to be had in great abundance at no great distance. The high-bred Leicester, and many others, are of the above description, which soon show themselves on the approach of severe weather.

‡ Although the proper treatment of sheep throughout all the various stages of life may be similar, yet the quality of food may be a little inferior, and the situation more exposed, as they advance in years, should circumstances require it.

SALVING, OR SMEARING.

The salving or smearing of sheep is now become very general in some parts of England,* particularly in the north. It does not appear to have been known by the Romans, but is now generally practised over most of Scotland, and, in some parts of it, seems to be of an old standing.

> "Fra kings to him that hads the plow,
> Are all oblig'd to tarry woo."

It is supposed that this practice has been derived from Spain, where they anoint their sheep with a mixture of honey and bitter herbs, in order to destroy the ticks or cades that nestle in the wool. But, from the climate in this country not being so favourable for the production of honey as to render it an article of so little value as to be applied to the anointing of sheep, tar may very easily be conceived to have been introduced as a substitute, which must be equally efficacious.

As to the utility of this operation, writers seem to be divided in opinion; but such a division can only originate either from want of experimental knowledge, or from a wish merely to become a writer on the subject. Any of my readers who may have had the least experience from having part of their stock salved and part not, whether on hill or dale, must be thoroughly convinced that salving keeps the sheep dry and warm through winter; that it facilitates the growth, and increases the quantity of the wool; that it destroys vermin, and prevents many diseases, particularly the scab; in short, that, when properly executed, † it furnishes a vigorous, healthy stock in the spring, covered with firm coats, while the want of such an application too frequently produces, at the above season, a weakly, unhealthy, half-naked stock. So much am I convinced (from experience) of the certainty of the above results, that I cannot figure the having of one reader that is otherwise; but to those who may not have had such experience, and may entertain any doubts on the subject, I would recommend to try the experiment upon a small scale,* and I am persuaded that one trial, if a severe winter, will be a satisfactory proof of its utility, and that in future they will not lose the hog for the halfpenny worth of tar. The salving or smearing of sheep is generally performed in the month of November, although in some places much earlier: it should, however, be finished before the approach of the severity of the winter, and be executed in dry weather, always putting as many into a house the night before as will serve the next day, in case of rain. It is likewise much better to handle sheep in this manner when their bellies are empty. The method of performing the smearing, or salving, is now so generally known as to require no explanation; and the number which can be smeared by one man in a day will vary from 20 to 30, 40, and even 50, according to the size of the sheep, the lightness or heaviness of putting on the salve, and the expertness of the performer. The mixing of the ingredients,† and the quantity of salve

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* The application of tar, butter, &c. upon sheep, receives one or other of the above names, according to the proportion of the ingredients, and manner of applying them. When tar is the predominant ingredient, and put heavily upon the sheep, it is then termed smearing; but when any greasy substance prevails most, and is lightly put on, it is called salving. Smearing is the most prevalent name in Scotland, and salving in England.

† The principal attention requisite in having smearing properly executed is, to have it done in due season, ingredients well mixed, and in proper proportions, giving a sufficiency to each sheep, but no more, according as its age and nature of the situation may require: but this may be all done without having the desired effect, if the salve is not properly laid upon the skin,

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(and the strips or sheds made so close to each other, as to prevent vermin lodging between them,) but put entirely upon the wool, by not dividing it properly; which is too frequently done by careless or inexperienced performers.

* In making a satisfactory experiment, a few of the different ages of a medium quality should be left unsmeared; and in the spring of the year draw comparisons between them and such smeared ones as were equal in quality at smearing time, the latter having been marked at smearing.

† The salve is usually mixed in the following manner:—First measure as many pints of water into the tubs (to be used for smearing) as they will hold; when the butter is added, mark where the water reaches on the side of the tubs; then empty it out, and fill the tubs up to the marks with tar; after melting the butter upon a slow fire, add the quantity wanted to the tar in each tub, stirring it well until thoroughly mixed: for tar is of such a penetrating nature, that, if not qualified before applying it to the sheep, it is

which ought to be applied to a certain number of sheep of various ages and in different situations, are of the utmost consequence. Tar and butter, or tar and palm oil, are the principal requisites. Although the latter is by some preferred, yet the former seems to be most generally approved of. In very exposed winter situations, 10 pints of tar are mixed with 24 lbs. of butter, English weight, and are found sufficient for smearing 45 hogs, or about 50 old sheep;* while, in less exposed situations, 8 pints of tar are mixed with 24 lbs. of butter, and are considered sufficient for 50 or 55 hogs, or 60 old sheep. But one-third more of tar than melted butter or oil, and 10 pints of the mixture to 20 or 22 hogs, may be said to be an average proportion for high exposed grounds; and for low sheltered situations, (where the long wooled race may be said to preside,) as much as 40 lbs. of butter are mixed with 8 pints of tar, and will salve from 8 to 10 sheep more than the above. The price of smearing or salving has varied of late years from 4d. to 6d. per head, according to the price of material, and manner of applying it. But, as the tar less or more diminishes the price of wool, according to the quantity used, from the difficulty of scouring it clean from the wool previous to its being manufactured; so the operation is facilitated, and made more effectual, according to the proportion of butter used; for the greater it is, the less injury will the wool sustain from smearing.† But the proportion of ingredients for smearing, or salving, must be entirely regulated by the situation where it is used. I hope it is unnecessary to say any thing here of the impropriety of smearing such sheep as are intended to be made fat du-

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apt to kill them. Salve ought to be made up some time previous to the salving, as it puts on much better when stiff.

* The circumstance of hogs requiring to be heavier smeared than old sheep, (which experience has proved to be indispensable,) is likewise a proof of its destruction of vermin, and support during the severity of weather, from both of which hogs are most likely to suffer.

† It must be admitted by the most strenuous advocates for smearing, that it less or more depreciates the price of the wool per pound; but the increase of the quantity of wool and quality of the stock does more than doubly compensate for such a loss.

ring winter, and the propriety of using the preventive for the scab at this period,* upon such as are to be smeared, if there is the least cause of suspicion of this disease breaking out in the flock.

SHEARING.

Although the result of experiments made in the year 1800 at the French national farm at Rambouillet, was that Merino wool of two years' growth will double its length, and preserve all its fine quality, and the sheep subjected to such experiments were not the least injured; and, likewise, that satisfactory experiments are stated to have been made by some enterprising breeders in England, and that it is found, in certain cases, long-wooled sheep might be shorn twice, and even three times, to advantage, without the animals receiving any injury; yet I trust it is unnecessary to use any means here of convincing my readers of the necessity of shearing sheep once in the year in Scotland, and of the impropriety of trying any of the French or English experiments here inserted. Sheep shearing is generally executed in the month of June if the weather is warm, but the proper time will vary according to the climate, state of the weather, or condition in which the sheep may be.† The best criterion to go by, when taking the state of the weather into consideration, is when the general disposition of the fleece shows a spontaneous separation from the skin, which is termed by most of shepherds, "the wool well risen:" however, when the shearing can be accomplished at the above season, it is much better than if later, for the wool has then time to grow so as to protect the animals from the depredations of the fly and the storms of winter. Some time previous to the commencement of shearing, the sheep ought to be well washed, in order to remove any dust, &c. that may be adhering to the wool. This is performed in various ways, according to the convenience or situation of the water to be used. But when a choice is to be had, I consider the following to be preferable, viz. surround the sheep by a railing, &c. on one side of a gentle running stream, deep enough to take a sheep over the head; and when they are perfectly cool,[*] let them be handed to men placed in the water for hand-washing, while some person is ready to receive them on the other side, and conduct them to some dry clean spot until they are all washed, when they may be removed to some clean pasture having no access to gravel pits or sand banks, and allowed to remain until thoroughly dry, when they are in general immediately shorn. It would, however, be much more advisable to pursue the system followed by some of the breeders in Sweden, viz. after washing let the sheep remain in such a situation as above stated, for two or three days, or even more, should the weather permit, in order that the fleece may imbibe a new yolk, which imparts a greater degree of softness and elasticity to the wool. This may be greatly promoted by housing as many of the sheep the night before shearing as will serve the shearers the following day, which is likewise necessary in case of rain or dew, as wool should never be shorn but when perfectly dry.[†] The ancient mode of stripping sheep of their fleeces is by taking them off lengthwise, commencing at the belly; which practice is still kept up in highland districts, (or more strictly speaking, upon the Cheviot and black-faced breeds and their descendants,) and even in various parts of the Lowlands. It is generally executed in a very rough manner, some ounces of wool being left upon the sheep, which greatly impedes the next year's growth.* This mode of shearing is however now superseded in various parts, by the improved method of cutting circularly round the body, beginning at the head; and from the posture necessary for the animal to be placed in so as to accomplish this mode,† it is executed more neatly and closely than the other, and should therefore become more general,‡ although it should not be so closely executed upon mountain sheep as upon those in the Lowlands. Should the skin be injured during the time of shearing, as not unfrequently happens either by accident or inexperienced performers, a little tar should be put upon the wound, and covered with dry mould: spirit of turpentine is sometimes used instead of tar, but I should prefer putting it above the dry mould which covers the tar. Should the weather be cold or changeable about the time of shearing, sheep are apt to catch cold after losing their covering: where easy access can be had to the sea, bathing them immediately after being shorn is found to be a preventive, and otherwise very beneficial; but those who may not have such an opportunity, and whose flocks are small, may rub them all over with salt and water.

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* See sect. iv. in this chapter, article Scab.

† Sheep in good condition are much sooner ready for shearing than those in bad condition; the wool of the former will, early in the season, have a tendency to rise from the skin by a fresh growth, while the latter will have no such tendency until late in the season, if even then.

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[*] I have frequently known sheep to have sustained much injury from being immediately plunged into water after having been heated by driving or gathering together.

[†] Wool, when shorn wet, heats in the pile, loses much weight, and consequently its value is decreased. An act of Parliament specifies that the time for shearing, after washing, shall not be sooner than ten days, nor longer than fourteen. The law further provides against imposition in selling wool, by ordaining licensed people, called 'winders,' to put up the wool after it is shorn. They are sworn to do justice between buyer and seller; not to break any fleece, nor wrap up more than one fleece in a bundle; to wrap up the fleece free from dirt; and in piling them up, not to put the best in front, but observe that the whole pile be equally alike throughout.

An expert performer will shear, in the circular manner, from 30 to 35 of the large sheep in one day, but 20 to 25 are considered a sufficient day's work; and by the old mode of shearing lengthwise, 45 to 55 of the short sheep are a general task, while some expert (although rough) performers have been known to take off 80 and even 100 fleeces in one day; but such numbers are only executed when assistance is given in bringing the sheep prepared to the shearer, and rolling up the fleeces,* which one man is sufficient to perform to three or four shearers.

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* Experience has shown that wool resembles grass very much in this particular, by not growing so well if not cut close.

† In order to accomplish the circular mode of shearing properly, the sheep must be kept sitting upon its bottom, with the body quite erect, by which means the skin is kept quite tight to the body, and the wool can consequently be taken off much closer and with less risk of injuring the skin with the shears.

‡ In highland situations, where the stocks are large and rather low in condition, as likewise of a restless nature, it perhaps might be expedient to continue the old method, by tying the feet, and performing in the usual way; and although, in very exposed situations, it may not be advisable to go just so near the skin as is done in sheltered situations, yet it would certainly be prudent to cut more evenly, and not leave such bushes of wool indiscriminately over the body, just as if one part required to be better sheltered from the severity of the weather than another.

Shearing of lambs of particular breeds in warm inclosed lands became very general in various parts of England some years ago, and is still continued by some breeders, but such a practice does not meet with general approbation; but such as do approve of it, shear their lambs about a month or six weeks after the old sheep. It is alleged by Dr. Parry, that shearing lambs of the Spanish breed improves the quality of the wool ever after; but I should doubt much if it would have the same effect upon the quality of the carcass or condition of the animal.† This practice, however, is not so common as it was a few years ago, which proceeds, no doubt, from the breeders having found, from experience, the bad effects which ensued: but however different the opinion may be as to the propriety of shearing lambs of particular breeds upon the rich, fertile, sheltered inclosures in England, I apprehend that there can be but only one voice as to the propriety of extending such a practice to lambs upon the lands appropriated for that stock in Scotland. The time of shearing is the period allotted for branding or marking the old sheep and lambs, which is either done with tar, ochre, ruddle, or various other colouring matter: but as it is sometimes difficult to remove the stains made by such substances from the wool, the late Dr. Lewis suggested the following composition, which can be easily washed from the wool with soap suds, viz. "Mix finely pulverized charcoal, or lamp black, which is preferable, with such a quantity of tallow, over a moderate fire, as will produce a black colour, and a proper consistence; and to render this composition more durable, a fourth, sixth, or eighth part of tar, may be incorporated with the tallow." There are various ways practised in marking sheep in situations where they are liable to be mixed with neighbouring flocks, either at home or at market. It is common for proprietors to mark with tar the initials of their names on various parts of the body, according to the different sexes or ages of the sheep; but in inclosed situations, and where the sheep are shown in pens when at market, it is more common to mark with some colouring in the following manner, viz. females are marked between the ears, with a broad stripe a little down the neck; castrated males or wethers are striped across the kidneys; rams ornamented with two or three stripes over the back, (at equal distances) extending half way down each side: but the way and manner of performing this operation is more a matter of taste than necessity. There are many other particulars necessary to be observed in the management of a sheep stock which might be here inserted, such as setting the stock, various ways of fattening, and the proper time of sending them to market; but as these are each more particulary connected with the system that may be pursued, and may vary accordingly, I shall therefore here defer taking notice of them, the discussion of which will more properly occupy a part of the chapter on the management of grazing farms.

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* For the proper method of rolling up fleeces, see note p. 189.

† Some years ago I had a considerable stock of the Leicester breed of sheep in the north-west borders of England, when shearing lambs was quite the rage. I was likewise induced to try the experiment; but the consequence was, that the shears left a mark which stuck by the lambs during the remainder of their lives; and so much was I satisfied of the impropriety of trying such an experiment, that I never made a similar attempt, nor would ever recommend others to do so.

SECTION IV.

DISEASES OF SHEEP.

It must be admitted that this species of animal is subject to numerous diseases, many of which prove very fatal; yet observation would dictate to us, that by nature they are liable to a small proportion of them, for if the origin of the greater part of such diseases could be properly traced, inattention and improper usage would be found to be the fundamental causes.* By a strict attention, therefore, to the necessary treatment to be observed during all the various stages of sheep's existence, (but more particularly when young,) although the diseases which too frequently attend them, may not be completely eradicated, yet they will be greatly diminished in number, and not so ravaging in their effects. But the effects of some soils, situations, and seasons, are occasionally instrumental of such diseases as it is much to be feared will never be quite got the better of; yet timeous precautions will prove good preventives. The limits of this work will not allow a very full discussion of all the various diseases incident to sheep, were I even fully competent for the task; I shall, therefore, at present confine myself to the most prevalent and deadly disorders which attend them, and in doing so, I will pursue a plan much similar to that already done on the diseases of neat-cattle; many of which being analogous to those of sheep, an occasional reference will avoid repetition. In order to ascertain when sheep are diseased, see General Remarks, p. 177, which, together with the remarks made in p. 129, relative to the discrimination of symptoms and diseases of neat-cattle, and the symptoms which I shall have occasion to take notice of in this section when treating of each disease separately, will, in most cases, be the cause of crowning the means used with the success of either proving a preventive or an effectual cure. But before proceeding to treat of the diseases separately, I must remind my reader of the necessity of still keeping in view the particulars relative to the necessary treatment both before and after performing operations, or giving medicine, which the particular diseases may require, as given in the Diseases of Neat Cattle, pp. 130—133; but no regard must be paid to what is there stated relative to the quantity of blood to be taken† or medicine given, as these will be here noticed when treating of each disease separately. I shall first proceed to notice the diseases most prevalent among lambs; secondly, those to which hogs are most subject; and lastly, those of an epidemic nature, or such as attack sheep in general.

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* When comparing the numerous diseases on one farm with the fewness of those on another of a similar nature, and even on different modes of management, on the same farm, it would evidently appear that diseases among sheep are more the effects of bad management than nature.

† Bleeding of sheep is generally performed by cutting a vein upon such parts as will not spoil the wool, and which is of easy access; such as some parts of the tail, spauld, or below the eye; sometimes in the foot, and in some

DISEASES OF LAMBS.

Lambs, when sucking their dams, are by nature subjected to no disease whatever. There are, however, diseases arising from various accidents, which frequently prove very fatal to them; such as the want of milk, or receiving it in an improper state, and the effects of castrating males in unfavourable weather and by inexperienced operators. Due attention being paid to the particulars mentioned in the section on breeding and rearing will greatly remedy those evils: there is, however, another disease, or rather accident, which, if not timeously attended to, proves very fatal, known by the name of *pinding*;—which is a stoppage of evacuation of the bowels, from the excrement becoming of a gluey nature,* and laying hold of the tail and buttocks, which, by the heat of the sun, are pasted so close together about the fundament, that all possibility of evacuation is prevented: this causes the animal to burst in a short time. The usual method of relief is to take the lamb by its four feet, setting it upon its bottom, and drawing it along the grass until it is perfectly clear, and then dust it with dry mould, which prevents the parts from fastening again.

DISEASES OF HOGS.

BRAXY.

This may be said to be almost the only fatal disease unto which hogs are subject, and although principally confin-

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particular cases in the jugular vein; but on whatever part it is performed, no blood ought to be allowed to remain upon the skin or wool, as it causes the fly to torment the animal and leave its pernicious effects, the maggots, if in the season for them.

* The cause of the excrement getting into the above state is from the milk that the lamb receives being strong and thick, which is peculiar to ewes in high condition, and late vegetation.

ed to sheep of this age, yet singular instances have occurred of a certain species of the braxy carrying off old sheep. The mortality of this disease makes it heard of throughout several parts of the kingdom where it is not known from experience, but its being now almost universal, particularly among large flocks, makes it too well authenticated from the increasing ravages which it commits. It however seems to be better known than understood; but observation clearly demonstrates that the commencement of this disease, in general, is regulated by the earliness or continuance of vegetation, particularly when accompanied with sudden changes from open weather to hoar-frosts; and that it is a stoppage of blood which causes inflammation, and thereby speedily terminates the existence. The former of these facts will be readily admitted by those who have suffered from its effects; seeing that the greatest losses are in hoar-frost nights in the latter end of autumn, when vegetation begins to cease, or in the beginning of the spring, when vegetation has commenced: and the latter will be as firmly substantiated by those who have been in the habit of skinning such victims, who must invariably have observed the commencing state of putrefaction which some part or parts of the body or intestines have been in, caused from inflammation. But, to strike at the origin of such effects, I would here hesitate to give a decided opinion, being as yet not thoroughly satisfied as to that point. In Mr. Hogg's "Shepherd's Guide," where this disease is very fully and minutely discussed, (and from his experience he ought to be as correct as most writers on the subject) he treats of it under four different heads, viz. bowel sickness, sickness in the flesh and blood, dry braxy, and water braxy.* The first two he describes to be the same in every respect, both as to the cause (namely indigestion) and symptoms; only differing in the internal infection, viz. in the former the stomach and intestines only are principally infected, while a small part of the inflammation is communicated to the flesh; and, in the latter, the fleshy parts are all swollen and corrupted, while a small portion is communicated to the stomach and bowels; and such as fall victims to this disorder in the spring are of the latter description. Stating these to be facts, he infers from them the probability of one originating in a stoppage in some of the blood vessels; and the other in a stoppage in some parts of the bowels; but be that as it may, they are certainly both consequences of indigestion. Mr. Hogg further proceeds to state, that the causes of the indigestion arise from the hogs being deprived of green succulent food by frost, and being obliged to have recourse to a coarser sort, such as heath, bent, &c. which are of a more costive nature, and not easy of digestion; which, from a change of atmosphere, from a moist to a keen sharp air, creates such an appetite as to make them devour such dry hot herbs with great voracity, and take a fill of them equal to what they did of the green succulent grasses. The stoppage, which causes the inflammation in this case, he conceives to proceed from wind in and about the stomach, occasioned by the plentiful mixture of these so very different kinds of food. Mr. Hogg adds, that such is the very cause of that braxy which hath cut off so many thousands of excellent young sheep, not the least doubt need be entertained. As to the third species, viz. the dry braxy, which he treats of, he says that it can hardly be said to proceed from indigestion; and that it makes its attacks during storms of snow, when the walk of hogs is much circumscribed, and when they are confined too much to the tops of heath, bent, and other dry sapless food; but it only seizes on such as have plenty of grass when the weather is soft.[*] The carcasses of those which die of this species are much less swollen, and not nearly so blue and putrid as those of the other two; the stomach is scarcely infected in the least; but the small therms are mortified, black, soft, and almost rotten. Such hogs as are infected by this kind of braxy, sometimes linger on a day or two in great agony, and only appearing a little swollen. Mr. Hogg further remarks, that all these three are visibly different species of the same malady, of which the smell itself is a sufficient proof; and that, in the first case, the belly is prodigiously swollen, even so much that it sometimes bursts; in the second, the whole body is hoven and swollen like a loaf; and in the third case, the belly only is a little swollen. The fourth, and last species of this disease which he takes notice of, is termed the water braxy;* but whether the disease alluded to is indeed a species of the braxy, he says, will admit of some doubt, though it is always viewed by the shepherd as such, from the first symptoms and other external appearances being somewhat similar, while the internal ones differ widely; as such as die of this disease, when opened, have their entrails swimming with bloody water, none of which is within the guts, being only within the rim of the belly.

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* The above-mentioned disease seems to have been first distinguished to be a species of the braxy by the Rev. Dr. Findlater; but was held out by many not to be in existence, although Mr. Hogg says that he has perfectly ascertained its existence, from having seen and dissected several sheep affected with it.

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[*] It will consequently follow, from the above remarks, that the dry braxy also proceeds from a change of food and change of weather united.

Having now given a limited extract of Mr. Hogg's ideas relative to the cause of this most deadly of all the diseases which attend the sheep tribe, I shall here insert his cures and preventives *verbatim*. "The only cures which I can freely recommend are in every shepherd's power, and are as follow: First, If the animal is found in time, let him give it a severe heat by running; if this do not cure it, nothing that I am acquainted with will. However unfavourable this may appear, let him hunt it well, and follow after it, that it lie not immediately down on leaving it, or, if it lie down, let it be in a house. Many shepherds have discovered this by chance, who yet are ashamed to be the first to acknowledge it. The next is bathing amongst warm water for the space of eight or ten minutes at least, when a quantity of water-gruel, mixed with butter, or some softening ingredient, may be given them as an injection, or otherwise. Care must be taken, however, that none of these are administered for the water braxy, because either of them occasions instant death. The bath makes them bleed inwardly, and die forthwith; neither is a chase productive of any good to them, but evil. If you get hold of it, this is easily discovered, by putting both hands to its belly, and working them with a quick vibration, when, if it be the water braxy, it will jumble; but, if it cannot easily be got hold of, you may guess by the appearance of the swelling, which, in the common cases of the braxy, rises on each side of the back, but in the water braxy hangs low. But, in all cases, bleeding is good; and, if they bleed freely, or by any means can be made to purge freely, there is great hopes of their recovery." Mr. Hogg recommends pasturing the young and old sheep together, as the best means of preventing the braxy; for he says, " By this plan the sickness or braxy is almost totally eradicated wherever it has been introduced; for the young of the flock follow after, and share the experience of those that are old, both with respect to what food is proper for every season of the year, and time of the day, and gain much by feeding along with them for some hours every seasonable night, when they would otherwise have been lying fasting, and so hungry next morning, that they are apt to wrong their stomachs by eating too freely of any thing that comes in their way. By thus rising in the night, too, they are enticed both to pass urine and dung, by which the water braxy is totally prevented from attacking them, and a stumbling block laid in the way of others. But as this plan is not eligible in every instance, and where great numbers of wedder hogs are kept for sale or otherwise, it is necessary, to prevent confusion, that the hogs be pastured by themselves. Let such tenants and shepherds attend to the following observations. I observed formerly, that all kinds of food which preserve a continued vegetation, are preventives for this malady, and, where these are attainable, a retreat to them is often of great utility; but where they are not, (which is often the case,) let the farmer take notice, in the first place, *to choose his hog fence on a part of the farm which consists, as nearly as possible, all of one soil.* It is no great matter whether the soil is fine or coarse, providing it be all the same."

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* The above-mentioned disease, known by some under the appellation of water braxy, I conceive to be quite analogous (if not entirely the same) to the red-water or resp, which I became early acquainted with, from the experience of losing many a valuable sheep. (See description of Red-water or Resp, p. 220.)

Mr. Hogg's remarks on the braxy are certainly highly deserving of attention; and as the limits of this work would only admit of part of them being here inserted, I would recommend the perusal of his treatise to all who may be suffering from the ravages of this deadly disorder, or indeed any of the most prevalent ones unto which sheep are liable. But as it is now upwards of eighteen years since Mr. Hogg communicated his ideas to the public, experience may have suggested new ones of equal importance, of which I would willingly believe Mr. Hogg to have his share; and as the nature of this treatise calls upon me (however unable for the task) here to insert my ideas on the subject, I shall proceed to do so without either conceiving them to be altogether new or confined solely to myself. Although many of Mr. Hogg's judicious remarks upon the cause of this disease may not be quite familiar to many of my readers who may have suffered from the effects of such a malady, yet they must be completely so on taking a retrospective view of past events. But there is one particular in which observation does not allow me to coincide with Mr. Hogg, viz. when he affirms, that the mixture of various kinds of food, occasioned by sudden changes of open weather to frost,* "is the very cause of that braxy which hath cut off so many thousands of excellent young sheep;" for, according to this theory, the first, and perhaps the second night's frost, must pass over without any loss being sustained: now it has repeatedly come under my observation, (and must have likewise done so with many of my readers,) that great losses are sustained by this disease on the very first night of frost, or rather rime or hoar-frost, upon green soft pastures of no variety of herbage; as likewise upon similar ones with quantities of heath interspersed, which, in the former, could afford no opportunity, and in the latter no time for collecting such kinds of food as above alluded to. From this last remark, therefore, it would evidently appear, that either the sudden change of atmosphere, its immediate effects upon some kinds of food, or preventing the animal from taking its usual exercise when the stomach is loaded with such food, are likewise causes of braxy; but I am more inclined to suspect the latter to be the most general one.* The circumstance of this disease being prevalent and fatal in the spring, is a further proof that the sudden change to a variety of herbage is not the sole cause of it, but that the sudden change of atmosphere upon a certain kind of food, connected with a want of exercise, has its effect.† In allusion to the former it may be observed, that, as vegetation commences in the spring, the hogs leave the varieties which they have been obliged to resort to during winter, and depend mostly, if not entirely, upon young shoots of grass, and at that period many of them are cut off by this disease. It would therefore appear, that the very changing from the variety of hot herbs to more succulent food of easier digestion, when accompanied with hoar-frost, is likewise a cause of the braxy; which may be observed is completely the reverse of what Mr. Hogg states to be the sole origin of it. And, to substantiate the latter, it may further be noticed, that where one hog dies of this disease on the approach of grass in the spring, when the weather is open and mild, ten will die when such is accompanied with occasional hoar-frost. But allowing all that I have now stated to be correct, although it materially affects the conclusion of Mr. Hogg's remarks relative to the only or sole cause of the braxy, yet it does not in the least infringe or rob such of its share of likewise being a mother to that disease; for, as there are various ways of catching cold, and a variety of results issuing therefrom, in like manner there may be various causes of the braxy, and different modes of attack upon the animal frame, according to a variety of circumstances, as to weather, herbage, &c. or states in which the body may be; which clearly accounts for so many different species of this disease. From what has been here stated, it may be remarked, that, according to Mr. Hogg's ideas and mine, the braxy originates from a variety of causes,* all which, ending less or more in inflammation, may justly be said to be the leading feature, or fatal result of the disease.

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* Mr. Hogg states, that it is more particularly at the commencement of frost, when vegetation receives such a check as to cause the animals to search for, and eat with voracity, such a variety of different kinds of food.

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* As a proof of the above, it may be observed, that, in hoar-frost nights, sheep seldom rise during the night, and as these nights are almost invariably the most fatal, it would therefore appear, that the want of exercise necessary for the digestion of some kinds of food, may sometimes be the sole cause; for this disease seldom attacks the animal during the day when it is occasionally moving about.

† Should the braxy be allowed to proceed in some cases, from the change which frost makes upon some kinds of food, connected with the want of exercise, I would clearly decide it to be upon soft grass of a succulent nature, seeing that it is at the falling off, and commencing of such, that the greatest losses are sustained.

Symptoms.—The first approaching symptom of this disease is the animal ceasing to chew the cud; and as the disease increases, it begins to loiter behind the flock, lying down and rising every two or three minutes; and when standing, it gathers its feet all together; the ears hang down, eyes look dull, with the white part inflamed, pulse strong and quick, panting much, and seemingly a difficulty of breathing, body a little swollen, urine high in the colour, blood dark and thick, and which scarcely can be had at all when opening the usual veins in endeavouring to effect a cure; and when the principal vein in the throat is cut, very little blood will issue from it.

Cure.—I might here cut very short, and say that there is no cure, or that there is no use in attempting to give one, seeing that not once in twenty times the disease is discovered with the above symptoms; and even then I need not here attempt to show how ineffectual all the various modes of cure have proved. Should, however, an early discovery of the approaching disease be made, bleed as copiously as possible, (for the nature of the disease will prevent any error as to too much being taken) and give an injection of water-gruel, softened with butter; and should a voiding of excrement ensue, which has been preceded by a copious bleeding, some hopes may be entertained of a recovery. But I have little faith to place in the success of the above, or any other method of cure which I have seen attempted for the braxy; besides, the greater number that die are found dead in the morning, although no symptoms were observable late the preceding evening. The only and most effectual object of pursuit left to the grazier is endeavouring to discover the best means of preventing it.

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* It would therefore appear, that, after the plausible reasonings advanced above, and which might be held forth, there is still left as much room for conjecture as to the real or only cause of the braxy, as there is for the smut in wheat, viz. whether it proceeds from soil, climate, seed, or a combination of part, or the whole.

Preventive.—I most readily agree with Mr. Hogg as to the great benefit resulting from the method of pasturing, which he has suggested as his first preventive, where it can be adopted: but my theory will not admit of agreeing with him in his second preventive,—where, in choosing a hog-fence, he says that it matters not whether the soil is fine or coarse, provided it is all of a kind. I am thoroughly convinced of the good effects which would result from the latter, while, at the same time, I am conscious of the bad ones which might proceed from the former. For it is admitted by Mr. Hogg, and must be invariably so by all who have either had experience or their eyes open to conviction, that sheep upon a farm possessing heath, upon a fine mould, or even a gravelly or sandy soil, are very subject to the braxy, while, on that with heath, upon a mossy soil, it is scarcely known; and, as I have already stated, and must likewise be admitted, that the braxy commences upon the former of these farms at a time when the hogs live solely upon the finest particles.* It must, therefore, follow that this disease (at least at times) must proceed from the effects of the finest grass, which ought therefore to be excluded from a hog-fence intended as a preventive for the braxy. From the remarks which I have already made relative to the mortality of this disease in hoar-frost nights, when sheep seldom move after once lying down, exercise would seem to be indispensable as a preventive: therefore, during the season when this disease is most prevalent, the hogs ought to be induced to take a moderate portion of exercise every day, by driving them about, particularly on such days as they seem to collect much together, and shrink from the blast; and when the situation or size of the flock will admit, the shepherd should go at night, after the hogs may have lain down, and move them about; this will cause a voiding of excrement and urine, and encourage digestion, all of which will be bars in the way of the braxy. But, in order to facilitate and render the above more expedient, let a large field be inclosed in a sheltered situation, as convenient to the shepherd's house as possible;* into which the hogs must be put every night during the braxy season. The shepherd must move them about this inclosure every night late, and morning early, so as not to overheat them: such treatment will be found greatly to abate the ravages of at least the hoar-frost braxy, if I may be allowed the expression. But to conclude: Although some may be disposed to object to what I have here stated, yet I am of opinion that there will be but one voice as to the braxy being most prevalent among such hogs as are in the best condition; consequently there can likewise be only one opinion as to a fulness of blood being an assistant cause of the origin of this disease: it must, therefore, evidently follow that, to avoid feeding to such an excess, or with such food as to bring hogs to such a fulness of blood, must also prove a preventive. Taking about two to two and a half ounces of blood from such as are in a high state of condition about the fall of the grass,† has likewise been found very efficacious. But from this disease (particularly the second species mentioned by Mr. Hogg) being in every respect quite similar to that so fatal among young neat-cattle, known by the name of black-spauld, why will not the bleeding and inoculation (see p. 152) prove equally successful in this case, to what it has done in preventing the ravages of the black-spauld or quarter-ill? Not having had any sheep stock of my own since this idea struck me, I have not had an opportunity of trying the experiment, although I have frequently recommended it to others to do so who had sheep stocks; but I have not heard of any of them who have as yet put it in execution, or reduced it to practice. I have, however, still the most sanguine hopes of success whenever it may be tried.

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* The time above alluded to is the first night of hoar-frost after fine open weather.

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* Where such an inclosure, as above recommended, could not be conveniently had, a hut should be erected convenient to the ground where the sheep are in the habit of lying all night, for the shepherd to sleep in during the season of the attacks of the braxy. This house, or hut, might be found useful at other times and seasons.

† The jugular vein is preferred to take the blood from in this case, it being difficult to get a sufficient quantity anywhere else.

DISEASES PECULIAR TO SHEEP OF ALL AGES.

DIARRHŒA, OR SCOUR.

This disease, although prevalent among sheep of all ages, is most frequently so among hogs. It consists of three different kinds, viz. the white, green, or bloody flux, each proceeding from different causes, and are readily distinguished by the colour of the excrement; but as the nature and effect of the latter (which I conceive to be the same disorder as that mentioned by Mr. Hogg, under the name of 'breakshuach or cling,') seem to be quite different from the others, I shall treat of them separately.

WHITE FLUX.

This species of the disease sometimes attacks lambs after being weaned, which is by some called the *weaning brash*; it is occasioned by a change of food from milk to grass, and sometimes from cold, as likewise from eating putrescent vegetables, such as the shells of turnip, &c. There is likewise a flux brought on by severe frosts, which is by some termed the gall; this however may be prevented by giving hay in the hoar-frost mornings, and a continuance of such food will cure those sheep which may be already affected.

Cure.—When this disease proceeds from either of the two first-mentioned causes, "take a table spoonful of runnet, put it into half a pint of milk, the ewe's is the best, although cow's milk will do; it must be immediately taken from the ewe or cow, and the runnet not put in the milk until the moment it is given, which should be done as quickly as possible, as the cure arises from the runnet and milk getting into the stomach of the lamb before it turns to whey and curd; for, if turned, it would be of no service; but by being introduced to the stomach in the unchanged

te, it intermixes with the food, and produces a regular
healthy digestion."* Or, "give a decoction of harts-
havings, and finely-scraped chalk, in which a few
opium have been dissolved, and keep them on dry
food, in a well-sheltered yard."†
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the diseased sheep must be separated from
ree large spoonfuls of the following mixture
m every second or third day, as the na-
ase may require: "Mix half a pound of finely
ed and sifted dry bay salt with one pint of old ver-
juice; and then add half a pint of common gin, and afterwards put upon wholesome dry food."‡ I have frequently cured this complaint by giving my patient about an English pint of new milk warm from the cow, with a little soot in it, for a few mornings.

GREEN FLUX.

This species of diarrhœa most generally proceeds from poverty, caused by bad wintering, and makes its appearance in the spring, regulated by the commencement of the young sprouts of grasses; which is too luxurious a change for the reduced constitution to bear; and, consequently, many fall victims to the complaint. It is likewise occasioned by a sudden change from poor dry food to that of a rich juicy nature, at any time of the year. It is, however, in general not attended with much danger, unless the sheep are very low in condition; guarding against which is the best preventive. But should this disease remain upon the sheep more than two or three days, they ought to be removed to an inferior dry pasture, and given some well-dried sweet hay; but if weak, and much reduced, taken into a house, and fed with hay, oats, oatmeal, new milk, &c. which kind of food will abate the flux, and strengthen the animals. Should the symptoms, however, continue to increase, and there be every appearance of the disease proving mortal, have frequently recommended it to others to do so who had sheep stocks; but I have not heard of any of them who have as yet put it in execution, or reduced it to practice. I have, however, still the most sanguine hopes of success whenever it may be tried.

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* Parkinson on Live Stock, vol. i. p. 411.

† Complete Grazier, p. 213.

‡ Complete Grazier, p. 211.

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When the disease originates from any of the last-mentioned causes, the diseased sheep must be separated from the flock, and three large spoonfuls of the following mixture must be given them every second or third day, as the nature of the case may require: "Mix half a pound of finely powdered and sifted dry bay salt with one pint of old verjuice; and then add half a pint of common gin, and afterwards put upon wholesome dry food."[‡] I have frequently cured this complaint by giving my patient about an English pint of new milk warm from the cow, with a little soot in it, for a few mornings.

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[*] Parkinson on Live Stock, vol. i. p. 411.

[†] Complete Grazier, p. 213.

[‡] Complete Grazier, p. 211.

BLOODY SCOUR, BREAKSHUACH, OR CLING.

This kind of flux is as serious and difficult of cure as the others are simple and easily cured. It generally attacks old sheep; and the primary cause is by overheating, particularly when accompanied with drinking cold water, which sheep are apt to partake of voraciously when in such a state; the bad effects of which are so generally known as to render any further discussion here unnecessary. This disease is one of the most infectious that attend the woolly tribe, and in many respects analogous to that fatal disease in neat-cattle called the *murrain* or *pestilential fever;* the one being equally epidemical and ravaging in its effects as the other. An early discovery of this disease is absolutely necessary, otherwise the consequence (upon the whole flock) will be deplorable, particularly upon soft grass pastures: in order, therefore, to facilitate such important discernment, the strictest attention ought to be paid to the following symptoms.

Symptoms.—Such sheep as are affected with the above disease usually linger behind the flock, or search for some place of retirement; they have seemingly an unquenchable thirst upon them, always wishing to drink at any appearance of water; reject food, and cease to chew the cud; and when minutely examined, will have a very sickly appearance, viz. red heavy eyes, drooping head and ears, a clung belly, wherein a rumbling noise is frequently heard, followed by a flux of a green or yellowish colour; and, as the disease advances, it becomes more and more mixed with blood, and of a fetid, nauseous smell, until at length the whole body becomes equally so. The rapidity in which the body wastes away is a sure indication of the disease; for, allowing a sheep to be in ever such good condition when first affected, in a few days it will be reduced to a skeleton.

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* Clater's *Cattle Doctor*, p. 353.

Preventive.—In pointing out the cause of this disease, the preventive appears quite visible, viz. guarding against overheating at any period or season whatever, but more particularly when sheep are beginning to improve in condition; and should by accident an overheating take place, they must be kept from water.

Cure.—Immediately, on discovery, the sheep affected should be removed from the flock, and secured in some place free from water, and any access whatever to other sheep: from the disease being of such an infectious nature, the patient must be rubbed over with a little turpentine, which will prevent any chance of infection. If the disease is discovered at an early stage, bleed below the eye, and give the following purging drink: "Epsom salts, one ounce and a half, or two ounces, according to the size of the sheep; ginger in powder, one large tea spoonful; treacle, one table spoonful: put them in a pitcher, and pour four ounces of boiling water upon them; stir the whole together, and give it when new milk warm."*

After the physic has operated sufficiently, the patient should be kept warm to encourage perspiration; and food of an astringent quality must be given; "eggs and sweet milk mixed with the bark of the alder tree ground to powder," will be found very suitable. Such sheep as survive ten or twelve days after the first infection in general recover, but most frequently lose their wool.

STURDY.

This disease is known by a variety of other names, viz. Dunt, Giddy, Turn, Staggers, Vertigo, Water in the Head, or Bladder on the Brain; but in Scotland it is more commonly known by the first mentioned. It generally attacks hogs, at least sheep under one year old are more subject to it than any other. It proceeds from a collection of water between the skull and brain, and is occasioned from much exposure to the severities of the weather without being afforded any shelter. Mr. Hogg asserts that a sheep whose back is covered with a piece of cloth will not take this disease, (and consequently infers that the water is ejected into the brain by the spinal marrow) and, of a well-sheltered flock, very few ever will.

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* Clater's *Cattle Doctor*, p. 370.

Symptoms.—The above names, when taken collectively, are a clear demonstration of the symptoms: however the first indications are, the sheep neglect to follow or keep company with the flock, their eyes stare and seem to fix upon some other object than that which they are afraid of, they appear quite stupid and giddy, start at a noise, stagger and keep turning round when feeding. The water sometimes settles in one part of the skull and sometimes in another, and continues to increase upon the brain until it concentrates in the middle of it, or in the hinder parts where it joins with the spinal marrow: if in the former it is difficult of cure, but if the latter, quite incurable.* But in whatever part the water settles, the part of the skull directly above it soon becomes soft; which by feeling with the thumb the seat of complaint is easily discovered.

Preventive.—The best preventive is to keep sheep well sheltered from the storm; if not put into houses or folds in the evening, they ought always to be collected into some sheltered situation. "In Saxony, several of the sheep owners keep their lambs in the folds during the first year, having remarked that such as are kept from the fields during that time, are very rarely attacked with this disorder. In Prussia, M. Lasteyrie states that he had been assured by many agriculturists that they had secured their flocks from the *Turn*, by fastening a linen cloth covered with pitch on the heads of the lambs, previously to conducting them into the fields. This kind of cap, they maintain, prevents the intromission of the worm which the flies deposit in the frontal sinus, during the earliest youth of the animals."†

Cure.—Although I have frequently effected a cure by tapping,* yet I have as often failed in the attempt, but I was latterly convinced from experience that my want of more frequent success proceeded more from an operation being injudiciously performed than its inefficacy when scientifically executed; for as I became more expert in finding out exactly the seat of complaint, and directing the tapping instrument accordingly, the number of deaths among my patients began considerably to decrease. The instructions which I received relative to the cure of this disease (as well as some others among sheep) were from William Elliot, an old shepherd of my father's and afterwards of my own; who was a native of the same county with Mr. Hogg, whose valuable treatise I afterwards had an opportunity of perusing; and on comparing notes from the instructions of my teacher and Mr. Hogg's remarks, I found them to be much similar, although the latter were more minute and explicit. Mr. Parkinson, in his Treatise on Live Stock, vol. i. p. 413, mentions his success in effecting a cure, by first pulling the sheep's ears very hard for some time, and then cutting them off pretty close; but he says, that in order to insure the efficacy of this remedy, the operation must take place at the first appearance of the disorder. I am, however, inclined to think that the tapping is the most effectual cure when skilfully executed. It is usually performed with an awl or hot wire, if the soft part is anywhere about the crown; but when the skull feels soft in the forehead, the operation must be performed by thrusting a stiff sharpened wire up one or other of the nostrils, until it is intercepted by the upper part of the skull: but the following description of using the wire, given by Mr. Hogg, will greatly assist the inexperienced performer and efficacy of the operation. "The operator must feel for the part of the skull that is soft, and lay his thumb flat and firm upon that; then taking the wire in his right hand, push it up that nostril that points more directly for the place that is soft, where the disease is seated; and if he feel the point of the wire below his thumb, he may rest assured that the bag is perforated, and that if the brain do not inflame, the creature will grow better; but if he does not feel the point of the wire press against the soft part of the skull, on which the thumb of his left hand must be placed, it will be necessary to try the other nostril." And when this operation is finished, Mr. Hogg says that it will be proper to take hold of the sheep with both hands behind the ears, and shake its head loosely. Mr. Hogg very properly gives a preference to using the wire as above described, for which he accounts in the following manner. "The reason I conceive why this is the most certain cure, is that the bladder being pierced on the lower side, the liquid continues to drip through the hole as long as any remains, and even as fast as it gathers, so that the perforation does not get leave to grow up or close again, until the animal is quite better; while on the other hand, although the water be ever so neatly extracted above by tapping, as soon as the sheep gets to its feet no more of it can get out; so that the aperture made in the bag again closes, and the disease goes on." Such operations as have been here described for curing the sturdy, may seem difficult to those who have not seen them performed, and might deter them from trying such experiments; but as sheep so affected invariably die unless the water is extracted in one way or other,* an inexperienced hand, if he does not effect a cure, will put the animal sooner out of pain.

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* Hogg's *Shepherd's Guide*, p. 55.

† Complete Grazier.

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* Tapping is usually performed with an awl or piece of wire, (some use it cold, others red hot) by perforating the bag which holds the water in or about the brain, which is penetrated in various directions according to the seat of complaint.

ROT, OR POKE.

This disease being one of the most common and fatal which attend sheep, has in consequence occupied the attention of the public more than any other, and drawn forth such a variety of opinions as to its origin, substantiated by facts and with apparently such sound reasoning, as would naturally lead to a conjecture of the causes being equally numerous as the opinions delivered on them. But fortunately experience has now reduced the field of conjecture into smaller bounds; for at one time one would have it to proceed from the animal feeding too much on soft 'tathy' grass or such as was sandy from having been flooded with water; another that it was occasioned by a course of changeable weather, from one extreme to another, repeating the old proverb—"Many a frost, many a thaw, soon makes many a rotten ewe;" while a third would have it that soft weather and a late growth of grass in autumn was the sole cause. Others say that there are two kinds of the rot,—the black and the hunger rot, the one occasioned by foul food, the other by too little food of any kind; while some attempt to prove that if sheep always receive plenty of food and good shelter, they will never rot, or at least it will never prove destructive. But Mr. Hogg holds it as an incontrovertible fact, that a sudden fall in condition is the sole cause of the rot, and attempts to make it appear (and with some degree of success*) that all the various causes already assigned, only serve to prove his to be the real and ultimate one.† There are, however, various other opinions not less deserving of notice than those already quoted. "Thus ('Letters and Papers of the Bath and West of England Society,' vol. i.) it is attributed to fluke-worms that breed in the livers of sheep, whither they are conjectured to be conveyed through the nostrils while the animals are grazing; but these worms are evidently rather the effect than the cause of rot. The late Dr. Darwin suspected it to proceed from the inactivity of the absorbent vessels of the livers of sheep, so that their bile becomes too thin, particularly in wet or moist seasons. Dr. Harrison, in a recent interesting tract on the rot, is of opinion that it originates from those unwholesome exhalations which arise from marshes; but to this suggestion salt marshes form a striking exception.[*] And it is a fact, that in the county of Lincoln, in rotting seasons, the sheep fed on salt marshes, which are overflowed by the spring tides, sell at very high prices, from the confidence that they are safe. From an attentive consideration of every circumstance, it is evident, that superabundant moisture either of food, (experience has proved that even one half hour's feeding on moist or marshy lands, in hot weather, will produce it) atmosphere, or situation, is the real cause of this dropsical malady, though it is certain that the dry limed land in Derbyshire will produce the rot,[†] as well as meadows that retain water and stagnant marshes; so, in driving sheep to any distance, if they be suffered to lie only one night on a wet spot of ground, whether in an elevated situation or not, they are very liable to the rot."[‡] Mr. Price (another writer on this subject) states that moisture is the occasion of it; whereof a redundancy, in conjunction with the prolific warmth of the sun, causes some insect to deposit their eggs on the tender grass, which, being conveyed with the food into the stomach and intestines of the animals, produce the animalcula that feed upon the liver, and destroy the sheep. The many instances which have occurred of sheep catching this infection in a night or even an hour when feeding upon wet swampy lands in a warm day,[§] in a great measure substantiates Mr. Price's opinion, as well as some others already mentioned; but such opinions, supported by such facts, either overthrow Mr. Hogg's theory or show that there are either two kinds of rot or at least two ways of infection, either of which may be very probable, and the latter I am perfectly inclined to believe. That most of the alleged causes of the rot may have a tendency to produce a disease something similar to it, may easily be conceived.* But, as I have already hinted, the circle of conjecture is now more circumscribed, by the true origin of that most fatal species of the rot being found to proceed entirely from sheep pasturing upon swampy wet lands, ravaging less or more according to the wetness and warmth of the season.† This is certainly clearly demonstrated by the disease disappearing in situations where draining has been executed to any degree of perfection; a perseverance in which I am thoroughly convinced would soon unhinge the name of its terrors, and (were it not from a perusal of writings on the subject) at no distant period bury it in oblivion. That pasturing sheep on the above situations is the primary cause, and the flukes‡ upon the liver the effect of one species of rot, I think cannot admit of a doubt; the one being demonstrated as above, and the other from those animalcula being invariably found in abundance feeding upon the livers of sheep which die of this disease: and that such is the cause of the animal's death would clearly appear from the whiteness of the flesh, skin, and even fat; all having the appearance of not the least blood being left in them.

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* Trepanning is another mode of extracting the water, but as it can only prove successful when expertly and skilfully executed, and as such cannot be acquired from the most minute description of the pen, I therefore decline inserting further particulars relative to it.

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* I am however still inclined to believe that a sudden fall in condition is more the effect than the cause of the rot, from its being almost invariably one of the earliest symptoms and constant attendants of it, and seeing that in some cases it cannot possibly be the cause, viz. when the infection is caught by a day or even an hour's feeding in some situations and seasons, as will be shown hereafter.

† Shepherd's Guide.

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[*] Vapours arising from a salt marsh are not so unwholesome as those from other marshes; but allowing that they are, it is evident that the food of the former speedily removes the infection if ever it had an existence.

[†] I am much inclined to doubt whether or not that disease produced by the dry lands of Derbyshire is the rot or merely something resembling it. And should it actually be the rot, I am of opinion that, were such lands as above alluded to minutely examined, some patches might be found similar to the half acre in the downs of Dorset, mentioned by Mr. Parkinson, (see vol. i. p. 422,) which rotted 200 sheep in 800, by the shepherd's allowing them to drink in a small basin which held water in the said half acre; and all the time that the sheep remained either drinking or pasturing upon this half acre, did not exceed fifteen minutes. For, as Mr. Parkinson very justly remarks, there may be only one acre in ten thousand that will rot sheep, and yet be sufficient to rot all the sheep which graze upon the ten thousand acres.

[‡] Complete Grazier, p. 198.

[§] For a number of instances, see Parkinson's Treatise on Live Stock, vol. i. p. 421.

The following general remarks are likewise fully substantiated from experience, viz. that fat sheep are equally liable to the infection as lean, but the former more difficult of cure;* that eild sheep are more liable to take it than ewes giving milk, and that the former being attacked by a lingering dysentery, are sooner carried off than the latter if even affected; that this disease is very rarely known on any but wet, spungy, foggy land, such as cannot properly be drained,—and that long pastures are not so apt to produce it as short ones; consequently overstocking must be dangerous; that on dry healthy land it is seldom, and on salt marshes never known; that the pasturing of heavy cattle, horses, cows, &c. along with sheep, is encouraging to the rot;† that June is the most frequent month for sheep catching the infection;‡ and that, from their being first affected, they will survive from three to six months,—although frequent instances occur of the disease remaining for years in stocks from the first infection, particularly among breeding ewes; and likewise that sheep may be made fat with the infection upon them. Such circumstances as the latter may vary, and occur according to the particular state in which the body may be during the first infection, from the kind of food or situation in which sheep may be afterwards pastured, or the season being less or more favourable. From what has now been stated, it must be pretty evident that the rot must at least proceed from two causes, one of which, as I have already stated, has been sufficiently confirmed from experience,—the other (a sudden fall in condition) which Mr. Hogg states to be the cause of that rot which has been often so severely felt in Scotland, in which he is so ably supported by men of extensive experience as to prevent me from entering into the field of combat with him on this head. I however do not hesitate to affirm, that, allowing this to be a second cause of the rot, there is likewise a third, viz. that of being caused from poverty alone, which must have frequently come under the observation of many of my readers; for how common is it among stocks (of both neat-cattle and sheep) which are poverty-struck, to see one or more occasionally die of the rot; and which proceeds entirely from a scarcity of food, occasioned either from overstocking or from not preparing a sufficiency of suitable food to meet the severities of a long winter or a late spring. This is clearly demonstrated by the neighbour of such a grazier as above, who possesses land and food of the same quality, but guards against such occasions of scarcity; seldom or never losing any of his stock by such a disease. But Mr. Hogg and his friends perhaps may be inclined to attribute the origin of such poverty to a sudden fall in condition, and consequently state that I am only strengthening more and more their opinion of the real cause of the rot; but such managers (of poverty-struck stock) as above alluded to, seem to guard cautiously against this, from never having their stock in such a state as to stand any fall in condition, far less a sudden one. Should, however, the above gentlemen not be satisfied with this definition, but still persist in my arguments supporting their cause, I must just retaliate upon them, by showing that theirs support mine, as Mr. Hogg mentions in his *Shepherd's Guide*, that three of his friends, viz. "Mr. Laidlaw of Cassock, Mr. Borthwick of Sorbie, and Mr. Grieve of Craik, all able and extensive farmers, firmly assert, and prove by many instances, that if you give sheep always plenty of food, and good shelter, they will never rot, or, at least, it never will prove destructive;" and he adds, "which is so near being according to my opinion, that it is in effect the very same." Mr. Bryden, another correspondent of Mr. Hogg's, after endeavouring to prove that the rot is entirely occasioned by a sudden fall in condition, adds, that "the only means of preventing it is to keep sheep at all times at a regular maintenance." Now, the opinions of these gentlemen, although they do support the cause of the rot assigned by them, (for certainly good regular maintenance is one of the best preventives of a sudden fall in condition,) yet they likewise support mine by such being the only preventives of poverty, which I maintain to be likewise one cause of the rot.

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* The red-water or resp is frequently taken for the rot.

† Wet seasons with occasional very warm days are the worst.

‡ The flukes resemble the flat fish called plaice, and are found upon the liver and in the pipe which conveys the blood from it to the heart; and their consuming such quantities of blood causes the animal's death. Fluke-worms are sometimes as large as a Queen Anne's farthing.

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* I might rather say that the former will admit of no cure, while the latter may, if not entirely cured, be checked, so that the loss ultimately will comparatively be trifling.

† This is accounted for in wet soils of a stiff nature, from the footsteps of the neat-cattle or horses retaining water until it become putrid, which is accounted for in various ways to produce the rot. But the 'tathy' soft grass produced from the grazing of horses or neat-cattle, is likewise a cause why some wish them extirpated from sheep pastures.

‡ The above season is however, more strictly speaking, regulated by the commencement of warm weather, it being only during this season that such an infection is produced, which is alleged to proceed from the warmth coming in contact with the superabundant moisture: no such infection is caught during frosty weather.

Symptoms.—This disease generally commences with dullness, accompanied with a carelessness of feeding, which is soon followed by a shrinking of the body, particularly in the belly, which is for some time quite clung, at which period the sheep begin to feed with great voracity: this is the only stage of the disease in which any thing like a cure need be expected. But as the disease advances, the belly falls down, the flanks fall in, the loins are flaccid, and by a pressure about the hind quarters, sometimes a crackling noise may be heard. At this stage of the disease, if the sheep are removed to some dry hard keep, their life may be prolonged by the disease being checked, so as to admit of their being put into tolerable condition, although they never can be made good mutton. But if no attention is paid in using any means, of at least checking the disease, it very soon assumes the appearance of a speedy dissolution, by the skin changing its vermilion tint to a pale red, and then becoming dappled with yellow or black spots; the wool is easily removed from the skin, the eyes lose their lustre, and have a white and pearly appearance, from the red veins being either contracted or entirely obliterated: such smyptoms are frequently accompanied with an obstinate purging, and during the progress of the disorder sheep become poked or chockered; but this is most peculiar to those which are affected with poverty.*

Preventive.—The modes prescribed for preventing this disease are equally numerous as the reasons assigned for its cause; and from what has been said relative to its true origin, I should imagine that further illustration on this head is unnecessary and tautological; but as such has been given in an indirect manner, it may be as well to insert briefly a few of the most approved and effectual preventives. "The late eminent botanist, Miller, advised parsley to be employed as a preventive, which is eaten with great avidity by sheep, (the delicacy of whose flesh it greatly improves) as instances have occurred where sheep, fed on parsley, remained sound, while those in the neighbourhood were affected with the rot. Mr. Mills, therefore, recommends sheep to be fed with that vegetable twice in the week, for two or three hours each time. In places where the rot is usual, it will be advisable uniformly to fold sheep before the dew falls, and to confine them in such folds till it evaporates, both in the spring and summer; feeding them with sweet hay, or other dry provender. In the Bath papers already referred to, it is remarked that no ewe is ever subject to the rot while she has a lamb by her side; and it is there recommended to place sheep, that are affected with this distemper, so that they can get to bark and young shoots of elder. Mr. Price (in the same practical work) advises every farmer to remove his sheep, in wet and warm seasons, from such lands as are liable to occasion rot; but if this object cannot be obtained, he directs a spoonful of common salt, and a like quantity of flour, to be given to each sheep in a pint of water, once or twice in the course of the week, by way of preventive. And, in case the disease be in an incipient state, he is of opinion, that the giving of such a dose for four or five mornings successively, will probably effect a cure; for the addition of the flour and water not only abates the pungency of the salt, but also disposes it to mix more gradually, and consequently more effectually, with the chyle. The late Dr. Darwin, however, conceived that salt would be more efficacious if it were combined with iron-filings and flour, and made into a ball, to be given every morning successively for a week. Further, as a preventive, it has been recommended by Mr. Varlo, an experienced agriculturist, to give each sheep a spoonful of common salt once a week when a 'rotting season' is apprehended; and when the animals are accustomed to it, he directs some dry salt to be laid on flat stones, in various parts of the pasture, as they will then lick it up without any further trouble."[*] The circumstance of sheep neither taking the rot while pasturing on salt marshes near the sea, nor in countries where salt is given to sheep with a view to promote their health,[†] clearly demonstrates the good effect which salt must have as a preventive. On suspicious land, or such as is apt to cause this disease, it would be prudent, immediately on the commencement of warm weather, to feed the sheep with salt, as already directed by Mr. Price. But although I am convinced of the efficacy of the last-mentioned preventive, and even of some of the others, yet I am well aware that such treatment can only be reduced to practice on inclosed lands, or among small flocks; therefore, on extensive sheep walks, and among large flocks, recourse must be had to draining the land,[‡] of which experience has so decidedly proved the good effects as to put an end to all conjecture or doubt on the subject, and might have rendered the insertion of all other preventives here unnecessary. But in such situations as cannot properly be made dry, about the commencement of the 'rotting season' let the sheep be removed to some dry healthy ground until cold or rather frosty weather commences.

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* As blood in its purest state contains a great proportion of water, and from the flukes (in the liver) having fed some considerable time upon the most solid part of it, by the sheep holding down their heads to feed, the watery part of the blood settles underneath the chaps, and forms a kind of substance called the poke or chocker.

Cure.—It would be presumption in me to speak of a cure for this disease at an advanced stage, never having yet seen it effected. But although I have great doubts as to effecting a complete cure, by removing every effect of the disease, the same as the sheep never had been infected, yet I have none as to a cure respecting its immediate fatality, and retarding its progress so as to turn the apparent victims to a good account. I shall, however, first give some highly approved of medicinal cures. "If medicine be necessary, let a ball be given daily, for a fortnight, composed of five grains of muriated quicksilver, and one grain of opium, in camphor or turpentine,—increasing the proportions, if the operation be deficient, and with slight intervals, if the balls operate too powerfully. When the sheep begin to recover, salt should be constantly given them with dry food, and when they are turned out, they should be driven to a dry, salubrious, and elevated sheep-walk, or into a salt marsh, if there be one in the vicinity." * Or, "farmers, whose lands lie in a low situation, and are subject to this disease, will find the following recipe of infinite value. Take nitre, in powder, six ounces; ginger, fresh powdered, four ounces; colcothar of vitriol, in fine powder, two ounces; common salt, three pounds and a half; boiling water, three gallons: pour the water hot upon the ingredients; stir them, and, when new milk warm, add to every quart of the mixture three ounces of spirit of turpentine, and bottle it for use. The following directions must be strictly regarded. Keep the infected sheep from food all night; on the following morning give to each sheep two ounces, or four table-spoonfuls of the above mixture. (Remember to shake the bottle well at the moment of pouring it out.) To those which are weak and much reduced by the disease, one half, or three parts out of four may be sufficient for a dose. Keep them from food three hours after giving the medicine, and then turn them into a dry pasture.

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[*] Complete Grazier, p. 202.

[†] The above is a practice in America. See Parkinson's Treatise on Live Stock, vol. i. p. 428.

[‡] See chapter on Draining: section on draining Sheep Farms.

It will be necessary to repeat the medicine every fourth day for three times, observing the above rules. But where only half the quantity has been administered, it will be proper to repeat it every second or third day for six times. Every shepherd should be provided with a small horn, containing just the proper quantity; this will save considerable time and trouble, when it is necessary to give the above drink to a number at the same time."† But as these recipes, however efficacious, cannot (as in the case already mentioned in the preventive) always be so easily adverted to, a removal of the sheep infected to a salt marsh, or to a dry pasture, and there fed with sweet hay and salt, previously mixed for cases of emergency, ‡ will be found most

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* Complete Grazier, p. 207.

† Clater's *Cattle Doctor*, p. 327.

‡ See chap. vii. sect. 8. on making Hay.

effectual, at least as a retardation of the disease, and most applicable to general use.

WIND AND HOVEN, OR BLOWN.

I mention these two different diseases together, on account of their symptoms being somewhat similar, although their causes and effects are widely different; yet, if immediate relief is not afforded, the result of both is generally immediate death. The former of these diseases generally proceeds from bruises during the time of smearing or shearing, and not unfrequently from a sudden exposure to cold after being stripped of their warm covering; such treatment causes a violent inflammation of the intestines, which is the mother of this disease.

Symptoms.—The sides a little blown up, a quick, short breathing, with a great aversion to walk, and the head hanging down.

Cure.—" On the first appearance of the complaint, put the infected sheep into some dry warm place, and bleed it freely. Bruise a quarter of an ounce of some carminative seed, such as caraway, anise, cummin, or fennel, and mix these with two ounces of Glauber's salts in a pint of water. Place it on the fire, and make it boil for a few minutes, then strain it off. Add a quarter of an ounce of powdered jalap, and while lukewarm, give the sheep a quarter of a pint of this liquor, well shaken together, every half hour, till it voids excrement. It should have no food or cold water till recovered, but a little warm water might be of service."

As to the latter of the above diseases, see description and treatment of the same among neat-cattle, p. 155, not forgetting, however, if medicine is to be administered, to regulate the proportion of ingredients accordingly. If a purging drink is wanted, that given for bloody scour, page 207, will answer.

RED-WATER, OR RESP.

This disease is of an inflammatory kind, proceeding either from an overloading of the stomach and intestines, by eating too much of any kind of succulent food, or from a collection of sand or gravel in the intestines while feeding on turnips. The cause is evident, from sheep becoming unusually full of that kind of food which creates the voiding of much urine; they sleep soundly, and from the want of exercise, those watery particles which go off by urine and perspiration remain in the bowels, which causes an immediate inflammation to take place, either in the stomach, intestines, kidneys, or neck of the bladder; and when the intestines are loaded with sand or gravel, the inflammation is much increased, and consequently the disease more rapid in its destruction. This disease, as I have already mentioned, I conceive to be the same as the water braxy mentioned by Dr. Findlater, and authenticated by Mr. Hogg; and judging from external appearances and other coincidences, it resembles very much the other species of braxy, as may be observed by comparing the following symptoms with those already given of the braxy.

Symptoms.—The first appearance is a loitering behind the other sheep, frequently lying down and rising, the body much swollen, the dissolution sudden and rapid, and more so in hoar-frost evenings than any other, those in best condition being generally attacked first. Such are the external symptoms of this disease; and when sheep are opened which fall a prey to it, their entrails will, in most cases, be found to be swimming in bloody water; whence arises the name.

Preventive.—When danger is apprehended in changing from a poor pasture to some succulent food, such as clover, turnips, cole-seed, &c. let such a change be effected in a similar manner to that recommended for neat-cattle, when putting them first upon clover. (See p. 155.) Causing them to take a sufficiency of exercise (by moving them about late and early,) produces a free passage in the bowels, the want of which seems to be the origin of the disease. If sheep are netted or flaked upon turnips, it would be advisable to put them into some lea or even stubble field every evening;* if at a little distance, the better; but, if such is not convenient, particular attention must be paid in occasionally disturbing them throughout the evening. And when one sheep is observed to die of this disease, give physic to the whole flock, as recommended in the following cure.

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* It may be observed, that sheep do not die so frequently of this disease when going at large among turnips, or when they have liberty to range in an adjoining lea-field, as when they are close confined upon turnips.

Cure.—This need only be expected, as in many other cases already noticed, if attempted in an early stage of the disease. First take a little blood, and give about one pint of water made very strong with salt, keeping the sheep always moving, and having an offer of plenty of water; or, "put a pint of salt to one quart of chamberlie; let it be well stirred, until the salt is entirely dissolved, and give each sheep about half a pint early in the morning." This is recommended by Mr. Parkinson to be given (rather as a preventive than a cure) to the whole flock, when one is observed to die of the disease. He further adds, that, "if about a table spoonful of soot be added to each sheep's dose, the better. This medicine will be found serviceable in almost all disorders. The best mode of giving it is:—Having the horn of a beast fully large enough to hold one-third more than the dose, with a hole bored in the small end, set the sheep on his haunches, his head being erect, and put the horn in at one side of his mouth, one man holding the sheep in that position, while another man, having the proper quantity in any small vessel, pours the medicine down the horn into the sheep's mouth." Mr. Clater, in his *Cattle Doctor*, states, that "whenever this disease makes its appearance amongst flocks of sheep that are feeding on turnips or succulent grasses, no time must be lost in putting a stop to so destructive a disease. The loss sustained by the grazier in consequence is often very considerable. The following medicine the author has had an opportunity of trying on a large scale, sometimes on five or six hundred sheep, belonging to one man, in the course of the day.

Take Epsom salts, six ounces; nitre, in powder, four ounces; boiling water, three pints: pour the water hot upon the salts; when new milk warm, add spirit of turpentine, four ounces; Bole-Armenic, in powder, half an ounce; mix and shake them well together: the dose is, from three to four table spoonfuls. When this medicine is intended to be given to a number of sheep, they must be taken from the turnips, or whatever they are feeding on, and put into a pen or fold-yard for two hours before it is given, and there allowed to remain for two hours after they have received it; after which they may be put into their pastures as usual. When this disease is so severe that several die every day, it will be necessary to repeat the medicine every third day, for three times or more, if thought proper. This will be found a powerful medicine in all inflammatory diseases, and in removing all those obstructions that so frequently take place in the kidneys, uterus, or other parts of the body, while feeding on turnips, or in a luxuriant pasture." The following is a further statement of this disease, given in the *Complete Grazier*, page 213. "The *blood*, or *red-water*, likewise often proves a mortal distemper to lambs. Its symptoms are, lameness and a slight swelling of the joints, accompanied with a violent inflammation that spreads over the whole animal, and which, if disregarded, terminates its existence in the course of twenty-four hours. This disorder is produced by too great a quantity of food remaining on the stomach, in a crude and undigested state. As soon, therefore, as the disease appears, the lambs must be taken home from grass, be bled, and an emollient clyster administered. Two or three ounces of castor oil, or as many grains of emetic tartar, should next be given, and the bleeding repeated, if no favourable symptoms appear; the treatment above specified being continued for four, five, or six days, as the case may require, and during which time the lamb should be fed with milk."

INFLAMMATION.

This disease being less or more connected with most of those already noticed, it might be thought unnecessary to say more on the subject; but as it does from various causes form a disease quite of itself, which if not attended to in time generally proves very fatal, it ought therefore to claim the grazier's attention as much as any of the diseases already discussed. This disease attacks different parts of the body, such as the lungs, liver, kidneys, bladder, and other parts: for the causes, symptoms, and preventives, see those given for inflammations in neat-cattle, page 146.

Cure.—On the first appearance of inflammation, bleed moderately either above or below the eye; but should it increase or be at an advanced stage, copious bleeding is necessary, and give the following purging drink: "Take Epsom salts, one ounce and a half or two ounces, according to the size of the sheep; ginger in powder, one large tea spoonful; treacle, one table spoonful: put them in a pitcher, and pour four ounces of boiling water on them; stir the whole together, and give it when new milk warm. Or the following may be given if thought more proper. Take castor oil, from two to four ounces, according to the size of the sheep; ginger and salt of tartar, of each a large tea spoonful; coarse sugar, one table spoonful: mix, and give it in a tea cupful of warm gruel. Either of these drinks will be found sufficient to evacuate the stomach and intestines; if not, they may be repeated once a day until they have the desired effect."*

EXTERNAL DISEASES OF SHEEP.

FLY AND MAGGOTS.

These diseases, or rather accidents which befal sheep, may be said to be one and the same; the one being the cause and the other the effect of the same disease. Sheep are most subject to this disease during hot, sultry, and showery weather, and particularly upon inclosed lands surrounded with hedges or wood where the fly does not only torment the sheep and keep them from feeding, but sows the seed for maggots, which arrive at perfection in twenty-four hours; and if allowed to remain two or three days the sheep will either fall a victim to them or render a cure very disfiguring, and detrimental to the health of the sheep afterwards.

Symptoms.—Should a sheep be damp or a little foul about its hind quarters, and a number of flies seem to torment it, an examination should instantly take place, when most frequently the seeds or 'strikings' will be seen by shedding the wool; but when such seeds are become quick and formed into maggots, the wool on that place becomes damp and wet, and the sheep will occasionally look back, similarly to those affected with scab, but more frequently hold down their heads and shake their tails, running from place to place and occasionally lying down, although remaining no time in that position. But as the maggots get strong, the sheep begin to sicken and search for some shaded and secluded place, where they will remain until they completely fall victims to those vermin. During the fly season sheep ought to be carefully counted and examined every day; for should the shepherd lose any of his flock and find them in the above secluded state, little hopes may be entertained of a recovery.

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* Clater's *Cattle Doctor*, p. 370.

Preventive.—Various remedies have been offered to the public in order to prevent sheep from being struck with the fly in the above season; many of which have failed in having the desired effect. I have, however, found dusting the sheep with the following mixture to be a complete preventive: Mix together in a marble mortar, "white lead, flowers of sulphur, and white arsenic, of each one pound in fine powder." From half an ounce to an ounce will be found sufficient for one sheep according to the size. There are various ways of dusting sheep; I always followed a practice handed down to me by my father, viz. previous to the approach of the warm months, clean all the sheep which may require it about the tail or otherwise, and some morning early, when the sheep are wet with dew, take as many of them into a house as can be dusted before the dew dry up with heat or be removed by catching them; let one person hold the sheep while another dusts on the powder with a drudging box, having the quantity allowed for one sheep only in it at a time; dust over all the back and sides, but more particularly the hind quarters, where the fly in general makes the first attack; let each sheep be turned out of the house as it is finished. The operators ought to have a silk handkerchief tied over their faces, and holding their heads as much from above the drudging box as possible, to prevent the bad effects which sometimes ensue by careless performers.

Cure.—A cure in this case (as well as most other external diseases or accidents which befal sheep) is more easily effected than in internal cases, from an earlier discovery of the disease being more easily made in the one than the other. Should the sheep, therefore, be discovered immediately upon the 'blowings' of the fly becoming quick and forming into maggots, I would recommend the following treatment, which I received in the same manner as the preventive, both of which I have seen practised for upwards of twenty years with almost never-failing effects, viz. "Mix with one quart of spring water, a table spoonful of the spirit of turpentine, and as much of the sublimate powder* as will lie upon a shilling: shake them well together, and cork it up in a bottle with a quill through the cork, so that the liquid may come out of the bottle in small quantities at once. The bottle must always be well shaken when it is to be used. When the spot is observed where the maggots are, do not disturb them, but pour a little of the mixture upon the spot, as much as will wet the wool and the maggots. In a few minutes after the liquid is applied, the maggots will seek to the top of the wool, and in a short time drop off dead. The sheep must, however, be inspected next day, and if any of the maggots remain undestroyed, shake them off or touch them with a little more of the mixture. A little train oil may be applied after the maggots are removed, as sometimes the skin will be hard by applying too much of the liquid. Besides, the fly is not so apt to strike when it finds the smell of the oil, which may prevent a second attack. This method of destroying maggots I have always found superior to any other, and it prevents the animal from being disfigured by clipping off the wool, which is a common practice in some countries."† But should, from neglect, a sheep not be discovered until the maggots have broken the skin and made some havock upon the carcass, I would prefer clipping all the wool off the place affected, and removing all the maggots carefully with a piece of stick prepared for the purpose. Should any part of the skin appear to be blown or hoven up, small incisions must be made with a penknife, as it not unfrequently happens that great nests of maggots are found so concealed; which, by putting a little of the above liquid into the incisions, will bring out maggots that would otherwise work their way into the body imperceptibly.* Rub a little train oil on the place from which you have removed the wool, and cover it with a piece of cloth by sewing it to the remaining wool or otherwise, in order to keep out the cold. The wounds should be inspected daily and kept soft by anointing with some greasy healing ointment. Tar mixed with butter is most frequently applied instead of the oil and covering, but I would give a decided preference to the latter. When destroying the maggots as above, it however must not be omitted to wet all the 'blowings' of the fly with a little of the liquid, and squeeze them well between the fingers and thumb.

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* A preparation of mercury called 'corrosive sublimate.'

† Henderson's Treatise on Swine. See Hints on Agricultural Subjects, page 116.

KEDS, OR SHEEP LICE AND TICKS.

These vermin attend sheep of all ages, but more particularly hogs and sheep in poverty. The keds or lice are of a brownish colour and flat shape, with three legs on each side of their head, and the ticks are similar in shape and colour, but are much larger. The best means of preventing the appearance of such vermin, is smearing, as already described page 185; but should this not be deemed practicable, a few 'sheds' of tar and turpentine, or the ointment recommended for the scab, (which is preferable) will soon make them disappear.

BLINDNESS.

This disease in some cases is considered to be epidemic, from instances being known of whole flocks being affected with it at once; but it is more generally brought on by fatigue or cold in elevated damp situations.

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* The above-mentioned liquid must, however, be used very sparingly, particularly when the skin is broken either by incisions made with the knife or maggots; for I have frequently killed many a valuable sheep by giving too liberal a dose to the maggots, before I was aware that such was the cause of the animal's death. Merely a wetting of the maggots is sufficient.

Symptoms.—The eyes become sore, and emit a sort of ropy humour followed by a white film spreading over them; and should the cause from which it generally proceeds be continued, (viz. exposed to cold or fatigue) the film gets thicker until the eye appears quite white, in which case a cure is longer in being effected.

Cure.—When the disease proceeds from fatigue, &c. as above, it will generally cure itself,* by putting the sheep affected into a well-sheltered inclosure free from ditches, ponds, or precipices, and there allowed to remain at ease for two or three weeks. However, when the eye is much inflamed, and in order to make a more speedy cure to prevent a falling off in condition, I invariably had recourse to the following method, the effects of which I never remember to have been once unsuccessful. Open the angular vein of the eye, hold the animal's head in an inverted position, so that some drops of blood may fall into the eye; this will in general remove the white speck from the eye, and immediately restore the sight:† but in cases of obstinacy a small quantity of pulverized crystal glass may be blown into the eye with a quill open at both ends.

FOOT ROT.

This disease proceeds from sheep pasturing alternately upon damp wet land or among long grass which retains the moisture, and warm, dry, sandy or gravelly soils; for by grazing some time in either of the former situations, the moisture causes the outer part of the hoof to expand, which, (when the sheep are put upon the latter) on becoming dry, cracks, and by sand or gravel getting into such crevices, the part gets hot and painful, and soon forms into a matter or pus, at which period it becomes so very contagious as to spread throughout whole flocks,‡ in a similar manner to scab, and becomes equally difficult of cure. It however sometimes proceeds from inattention to cleanliness alone.

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* Hogg's *Shepherd's Guide*, p. 118. † Complete Grazier, p. 191.

‡ Instances have been known when one diseased ram has been put to ewes quite free of the disease, and upon land never known to produce the rot, that he has infected the whole. See Parkinson on Live Stock, vol. i. p. 409.

Symptoms.—These are easily distinguished; at the commencement of the disease such sheep as are affected will be observed occasionally to hold up one foot when grazing, and appear a little lame when they walk, which is most perceptible when they first rise in the morning, but as the disease increases the sheep become quite lame, and frequently feed upon their knees; and when examined in this last stage, the hoof will be found to be quite hard, (caused from the heat in the foot) so that the substance formed has no chance to descend, but keeps working upwards, which if not discharged will break out at the top of the hoof, and the oozing of such fetid matter causes proud flesh to appear; if then allowed to remain any time in this state the disease will become incurable, and the foot will literally rot off. Although sheep labouring under this disease retain their appetites to the last, yet they gradually decline and are at last reduced to complete poverty, so that the question comes to be, what is the skin worth, and not the sheep?

Preventive.—The only and best mode of preventing this disease from commencing, is to avoid pasturing as above, and at all times keeping the foot clean; and when any sheep are observed to be infected, let them be instantly removed from the flock into some dry pasture where the other sheep are not intended to go unless infected also: for so great is the infection of this disease that I have frequently seen and had sound sheep infected by being allowed to range over land which had been pastured with diseased ones the year before. Indeed it is advisable upon inclosed land where this disease has been raging to a great height, that such land, but more particularly the inclosure which has been appropriated for the patients, ought to undergo a course of tillage,* previous to being pastured again with sheep.

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* Where a course of tillage would not be practicable, let infected sheep be confined upon some particular spot of dry heath, which could afterwards be burnt, or giving a field a strong dose of quicklime will render such land more safe to be afterwards pastured with sheep.

Cure.—The methods of attempting a cure are various: some of the most approved of I have here inserted, but which ever of them may be preferred, or indeed previously to any attempt of cure, the sheep infected should immediately be taken from the flock, and the foot or feet washed clean with soap and chamberlie, and the hoof well pared;* after which any of the following applications will in most cases prove effectual; the sheep being afterwards grazed upon clean dry land. 1. Bathe the foot with turpentine, and afterwards rub it all over with tar and bind it up with flannel.† Or 2. Pound some green or blue stone vitriol very fine, and apply a little of it to the part affected, and bind a piece of cloth over it.‡ Or 3. Two ounces of roche-allum, a similar quantity of blue vitriol, one ounce of verdigris, and a quarter of an ounce of animated quicksilver may be dissolved in a quart of good distilled vinegar; and a little of this liquid may be dropped on the diseased part, care being taken to keep the feet dry, and clean from all dirt or filth.§ Or 4. Spread some slaked quicklime over a house floor pretty thick, pare the sheep's feet well, and turn them into this house, where they may remain for a few hours, after which turn them into a dry pasture. This treatment may be repeated two or three times, always observing to keep the house clean, and adding a little more quicklime before putting in the sheep.‖ I have tried all the above remedies with tolerable success, but would give a preference to the last, having found it to be the most effectual; but allowing it only to be equal to the others, it being a safe, cheap, speedy, and simple cure, demands the attention of every sheep grazier, particularly those on a large scale. Other lamenesses which sheep are subject to are sometimes taken for the foot rot, although some of them proceed from quite a different cause; such as a swelling between or above the hoofs, which may always be prevented by cleanliness and cured by washing well with soap and urine, and afterwards turned to a dry clean pasture: should, however, the foot be very hot, pare the hoof until it bleed freely, in which case a cloth must be put round the foot, or treat as recommended for the foul in the foot of neat-cattle. (See page 158.) But there is likewise another lameness occasioned by an insect resembling a worm, either breeding between the claws or working its passage through the perforated skin. The worm ought to be extracted by working the claws in a contrary direction, when it will soon make its appearance, and a continuance of the friction will soon dislodge it altogether: care must be taken, however, not to attempt to pull out the worm, otherwise it will be apt to break and rot in the foot, which is very injurious. A little tar and spirit of turpentine may be applied to the orifice, and the sheep turned to a dry clean pasture.[*]

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* Paring until the hoof bleed, is much disapproved of by some, but as I have always followed that practice and found it attended with the best of consequences, I am consequently now become such an advocate for it, as to doubt whether or not a cure can be effected without it.

† Hogg's *Shepherd's Guide*, p. 170.

‡ See Parkinson on Live Stock, vol. i. p. 408, and Henderson's Treatise on Swine, &c. p. 112.

§ Complete Grazier, p. 195.

‖ The above cure I learned from my father about twenty years ago, and have here inserted it in his own words as recorded in his Treatise, already noticed, p. 113. But I observe that Mr. Parkinson, in his Treatise, vol. i. p. 408, claims the discovery, for which he received a silver medal from the Society of Arts in the Adelphi. Mr. Parkinson does not state the time of the discovery, but I am well aware that my father practised it for upwards of ten years before the date of Mr. Parkinson's publication.

SCAB.

This disease in its first stages seems only to be of a cutaneous nature, and will then easily admit of a cure; but if neglected it will enter the system and become very difficult of cure. It is too well known to require any description; it prevails most in wet situations and seasons, and is without any doubt very contagious; indeed so much so that sheep exposed to rub upon the same place with infected ones, either in the house or fields, are liable to the infection: great care is therefore necessary to prevent the spreading of such a disease, by instantly removing such sheep from the flock as may have the least symptom of it, or even the slightest cause for suspicion, and confining them in some house or field, where the other sheep are to have no access whatever. I would, in this case, as in the foot rot, whenever a field has been occupied with patients for some time, put it through a course of tillage before stocking it with sheep again, as I have frequently observed and found from experience, that, when this disease had got to such a height that it was found advisable to disperse the whole stock and replace them with clean sheep, such would instantly become infected, although many months had intervened since the removal of those from which the infection must have originated. When such infected pastures cannot be conveniently dealt with, as recommended in the case of the foot rot, they should be allowed to remain without sheep during a winter, and in the spring following a new stock may be put upon them, being previously rubbed with ingredients of defence against any infection which might chance to remain on the ground, whether proceeding from infectious matter or animalcula adhering to the ground or rubbing places.

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[*] Complete Grazier, p. 194.

Symptoms.—The approach of this disease is first observable by the sheep rubbing themselves against every post, gate, bank, or other suitable place that may come in their way; they occasionally look back, bite, or scratch and even pull the wool off the place affected with their mouths, and when laid hold off and handled on the place infected, they will throw back their heads and move their mouths as if eating or chewing the cud, but a degree quicker. It first comes out upon the skin in small scabby eruptions, which if not checked in time will soon spread over the whole body; the continual irritation or itching puts the sheep from feeding, and consequently soon reduces them to complete skeletons.

Preventive.—Smearing is the best preventive, which is clearly proved by sheep which are not smeared being more subject to the disease, and more liable to the infection than such as are; this is clearly demonstrated among the fine wooled breeds, which are seldom smeared and are as seldom completely free of the infection. But where danger is apprehended from the ground having been formerly stocked with infected sheep or otherwise, a stripe of the salve recommended as a cure put along the back and one along each side will be a further bar in the way of such infection.

Cure.—There are various prescriptions for this as well as other diseases, such as strong decoctions of tobacco in brine, sometimes mixed with oil of turpentine, train oil, and brimstone. Or, mix one pound of tobacco, one ounce of white arsenic, one pint of oil of turpentine, and six quarts of beef brine, with a small quantity of tar, and boil the whole till the ingredients become incorporated so as to form a liniment; in applying which every scab must be broken, and the sheep be well rubbed that the liquid may penetrate every part.* But Mr. Hogg, in his Shepherd's Guide, p. 96, states that "the most effectual cure is that which can now be got in any apothecary's shop, known by the name of *Sheep ointment.* It is a strong mercurial composition, and the most safe way is for the apothecary to put it up in small balls, each of which he may deem sufficient and safe to be rubbed upon a sheep at once; for as different hands may make it of different strengths, the most experienced applier can hardly be a competent judge how much is sufficient for each animal without some such precaution. Let the shepherd, then, take one of these balls at a time, and mix it with three gills or a mutchkin of train oil, and if the animal be thoroughly infected, put the whole of this upon it, as close to the skin as possible; but if it is only scabbed or itching on some parts of its body, perhaps each of these mixtures may serve two. If the infected parts are mostly on the back or upper parts of its body, the shepherd must make a 'shed' or opening of the wool exactly on the very ridge of the back, from the crown to the tail; let him shed it clean to the skin, and keep it open with both hands, while another pours in the ointment from a common tea-pot. He must not keep the wool too close down with his hands, else it will cause the ointment to drip upon it. In this case a few 'sheds' or openings will do, but if it is scabbed about the belly and throat, it must be shed very thick, and the ointment rubbed on the skin with the fingers, as it cannot then spread on the skin by running. Let it always de done in dry weather, and it is a safe and certain remedy, though perhaps the scab may again appear on the offspring of this flock." But that which is now most approved of and which I have (during the experience of upwards of twenty years) found invariably to complete a cure even in the most inveterate cases, and after other applications had completely failed, is the following: Take one pound of quicksilver, Venice turpentine, and common oil or spirits of turpentine, of each half a pound; put the quicksilver and Venice turpentine into a mortar, and beat them together until not a particle of the quicksilver can be discerned, then put in the oil or spirits of turpentine, and mix them well together; after which melt about four pounds of hog's lard over a slow fire, and add it to the above ingredients when lukewarm, and stir the whole until it become cold and firm. About one pound of the ointment is sufficient to dress from seven to ten sheep, according to the size and manner in which they are infected; but when the sheep are very large and much infected, five or six of them will require a pound to effect a cure: however the quantity necessary depends likewise very much upon the manner in which it is applied; for one pound properly laid and rubbed upon the skin will be more effectual than two laid upon the skin and wool in a hurried, careless manner. In applying the above ointment, therefore, it ought to be well rubbed upon the skin,* and such parts as may be formed into a large hard scabby substance must be well broken with the hand before putting on the ointment, in order that it may penetrate sufficiently to prove effectual; all such parts should be dressed separately, independently of the necessary number of regular 'sheds' to be used. It is common to put one row of the ointment along the back, and one on each side, but in severe cases a little of the ointment must be rubbed upon the head, flanks, and spalls, and a row put down each shoulder and thigh as far as the wool extends. The above ointment should always be applied in dry weather, as it is dangerous and not so effectual when applied in damp or wet weather, and when used as a preventive, only one or more 'sheds' may be made when the sheep are smeared. This ointment is superior to the liquid applications, not only in effecting a cure, but in promoting the growth of the wool and health of the animal; for soon after the application of the one the scab will rise from the skin, and wool begin to grow; while on the application of the other the scab remains so long on the part infected, as to prevent not only the growth of wool for that season, but to be injurious to its production on such a part ever after. As a further proof of the efficacy and superior advantages of the above ointment, and in order to establish more fully such facts as I have here suggested in its favour, it may be observed that such or something very similar is not only taken notice of by most writers on the subject, but is held out by them to be the most effectual cure; and they seem to vie with each other in describing its superior advantages.* It was communicated by Sir Joseph Banks to the "Society for the Encouragement of Arts, Manufactures, and Commerce," in 1789.

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* Complete Grazier, p. 208.

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* The 'sheds' ought to be prepared as directed by Mr. Hogg, and the salve neatly and firmly applied to the skin, avoiding as much as possible its application to the wool, as such cannot assist in the least in effecting a cure.

WOUNDS AND BRUISES.

Sheep are not so liable to wounds, &c. as horses or neat-cattle, excepting such as are much exposed to hedges, and dogs either of a vicious nature or such as have not been properly broke in. But when such accidents do occur, from whatever cause, let them be dealt with as already directed for wounds and bruises in horses. (See p. 60.) Or should the incision be of a slight nature, keeping clean, and anointing once a day with the following ointment, will, in general, be found sufficient. Take myrrh and socotrine aloes, of each one ounce, and four ounces of purified turpentine, and mix them with a quart of good brandy in a bottle; which must be corked up, and exposed for one or two weeks to a moderate heat, after which it may be strained off, and preserved for future use in a closely-stopped bottle.*

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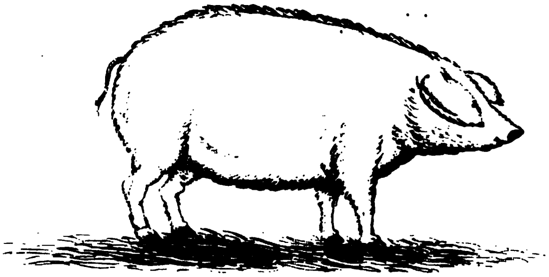
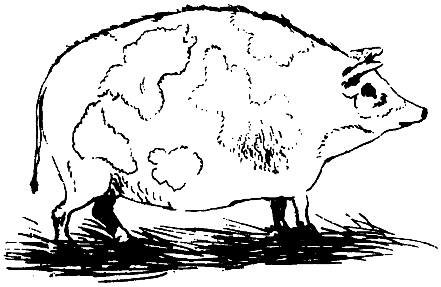
* See Complete Grazier, p. 208. Parkinson's Treatise on Live Stock, vol. i. p. 415. Clater's Cattle Doctor, p. 333. Henderson's Treatise on Swine, &c. p. 115.

Although I have now treated of such diseases as I conceive to be most prevalent among sheep, yet I am well aware that they are subject to numerous casualties which I have here taken no notice of, from not having (by practice) been at all acquainted with them. However, had not the limits of this work interfered, I might have given extracts from many intelligent writers, concerning such diseases as I have omitted, which might have been of use to the public. But as I am convinced that proper treatment and management, in all the different stages of life already noticed, will not only prove sufficient preventives to such diseases as I may have overlooked, but likewise to most of those which I have taken notice of, I deem it therefore unnecessary to swell out the number of pages by any further discussion on the subject; but strongly recommend it to those who may be acquainted with most of the diseases alluded to from experience, to endeavour to erase them from their memory by being as minute in their attention to the proper treatment of their stocks as they are obliged to be, in endeavouring to check the ravages of any fatal disease when it is introduced among them: and as to those who may still be ignorant of the different diseases of sheep, I am persuaded that they will suffer little by still remaining so, provided they make themselves thoroughly acquainted with the requisite treatment, and then act up minutely to what they know.

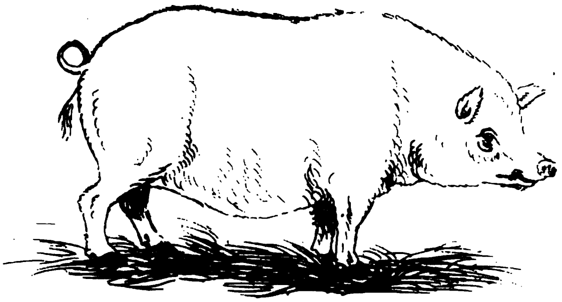
* Complete Grazier, p. 212.



Berkshire Breed



Large Spotted Woburn Breed



Black Wire-haired Breed

CHAPTER IV.

SWINE.

SECTION I.

INTRODUCTORY REMARKS.

No kind of domesticated animals are so much despised and neglected as swine, which arises from a long established prejudice against them,—handed down, I suppose, from the death of Eleazar, one of the principal scribes, who was constrained to open his mouth and to eat swine's flesh; but he, choosing rather to die gloriously than to live stained with such an abomination, spit it forth, and came of his own accord to the torment.* True it is that those animals are in many respects troublesome and disagreeable, but is this not greatly heightened by the treatment which they receive? therefore, before proceeding to take notice of the different breeds, and give the proper management requisite in breeding, rearing, and fattening swine, it might be advisable first to use some arguments, in order to wipe away the prejudice so unjustly entertained against this species of stock; in order that they may become more general favourites, and be deemed worthy of particular notice and attention: for which I cannot use any more suitable than those inserted in a treatise written by my father on the breeding of swine, where he proceeds in the following manner: "I have now undertaken to produce an argument to remove the prejudice against swine; but I believe I have taken upon me a task which it will be difficult to accomplish, as this dislike has so deep a root that I am afraid it will be almost beyond the power of argument to eradicate it.

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* See Apocrypha, 2 Maccabees chap. vi. verse 18.

Several people assert that the devil formerly entered into the swine, and that he is still an inhabitant in them. They certainly do not imagine that the Gadderene breed of swine was at any time introduced into this country, or apprehend that any of the two thousand that were drowned along with the devils, ever could find their way hither. Perhaps the devils might scramble out of the water; but the swine would be pretty quiet after having been choked. To be serious: They are said to be troublesome, and have a spirit of contradiction about them; and when they are wanted to go one way, they show a disposition to go exactly the reverse. This is partly true; but, pray, would not a horse, were he not trained, prove equally as obstinate and unmanageable? I have often observed the Highland ponies, when attempted to be laid hold of, after running at large upon hills for a few years, as wild as any pigs. I have not the least doubt that, if the same perseverance were applied to tame and break in swine, as is used with other animals, there would not be so much reason for complaint. I have frequently seen a pig following a cottager from one neighbouring farm town to another, like a dog. That person probably had only one sow, and had been at some pains to feed it regularly, scratch, or stroke it down, &c. With a little care swine become so tractable, peaceable, and familiar, that I have seen them grunting around a fireside with the children, and seeming as happy with their companions as if rolling among the mire in a warm day.

On the smallest offence of this animal, the following is but too often the prevailing practice. The gudewife cries, 'Jock! look if ye see the swine.' He instantly obeys, and observes them to be among the potatoes, or in a field of growing corn. The hue and cry is raised; the gudewife bawls out, 'Bless me! callans rin! for if ye're father kens we'll a' be murdered: Whitefit, Gowans, Fittie; hir, fie, stie!' All the cotter's collies about the place run, as they understand what is to be acted. The dogs are all set upon a poor animal, some biting its heels, others hanging by its ears; hunting it out of one mischief into another, until the poor beast is all torn and besprinkled with blood. Its adversaries still pursue the chase, until the creature runs home for shelter; then the dogs back for those which were left in the corn, and bring them home in a similar manner. The gudewife says to herself, 'The diel got into the swine lang syne, and he'll bide in them. Rob, stick them up in the auld byre, and let them stan yoner, till they're dwining for hunger; burst them! they're a daily cummer.' Next day they are turned out without a morsel in their belly, and run roaring mad from hunger, and will ere long be in another mischief; but who can blame them? No person can expect to reap any advantage from such treatment of the animal. The fact is, they are accounted worth no care, and allowed to ramble up and down, without any proper person to look after them, excepting in the manner above mentioned. At any time, whenever a sow hears the name of a dog called upon, although she is lying quiet, she immediately shifts about for a more secure hiding place, with a terrible fright, and looks as wild as if it was going to be a high wind. They are frequently half starved, which makes them the more ravenous. I see no animal about a farm that will be more peaceable and quiet than swine; as they are not inclined to ramble if they are well fed. Let horses, cattle, or sheep, be turned out without a keeper, giving them the same treatment as the swine, and then observe if they do not turn as unmanageable, do as much damage, and the character of the one become as black as the other." Such an argument as my father has here held forth, in order to show that the offences which these animals commit proceed more from the unwarrantable treatment or entire neglect of their owners, than from any natural bad disposition in themselves, I am well aware will not meet with a general sanction; but many instances might be here adduced in support of it: the following, I trust, will convince my reader of the docility and tractableness of these animals, when pains are taken and gentle means used. About twenty-five years ago, my father farmed very extensively in various parts of the kingdom, and upon one of his farms he kept at times upwards of 100 swine.* It so happened that the keeper of that flock was either taken unwell or abruptly left his service, one harvest, when every creature able to work was employed in reaping: a brother and I being the only idlers about the premises, the above flock was given in charge to us for a few days, until a proper keeper was found; we were then reluctantly obliged to march off with our 'hirsel' early every morning to a clover field about a mile distant, with our dinners, books, and great-coats, &c. packed upon our backs: we, however, soon began to think that it was a great hardship for us to be groaning under our loads while so many stout able ponies were trotting along before us at their ease, and immediately set about training one of them, to relieve us of our burden, which we accomplished in a few days, by occasionally scratching the animal and feeding it with bread, &c. out of our hands. It became at last so docile as to stand every morning until it received the burden girthed upon it, and then marched on in the rear, which place it was trained to keep, as we had more than once lost our dinners when it was allowed to join the herd promiscuously; and, in the same manner, we soon trained two or three more to carry the baggage in turns. Having been so successful in this training exploit, we then thought it would be turning our punishment into pleasure, if we could train each of us one to ride: this was no sooner thought of than commenced; and although we received many a tumble, yet we soon accomplished our design, and succeeded in breaking in each two or three chargers. At length our system became so complete, that we not only rode to and from the field, but whenever any of the herd were likely to stray, or go into some adjoining field of corn, &c. each alternately mounted his charger, and went off at full gallop to turn back and punish the transgressors.

Such as were trained seldom or never went astray, being always about hand, and in readiness to be mounted: in short, on such days as my father was from home, it was not unusual for a group of servants to receive amusement from my brother and me running set matches with our 'steeds,' which were determined in the usual manner, with whip and spur: and in this latter stage of management there was no such thing as bolting or tumbling going on, which occurred frequently during the training season. This system, however, at length came to my father's ears, from one or two of the racers happening to die in consequence of too severe heats or too much weight; when we were immediately disbanded from our office, and (our holydays being expired) ordered off again to school, which we set about with as much reluctance as we did the first morning in driving the hundred swine to the clover field. I shall just relate another instance of the tractableness of these too much despised animals, recorded in Mr. Daniel's "Rural Sports," where he gives the following account of a shooting pig called Slut. "Of this most extraordinary animal will be here stated a short history, to the veracity of which there are hundreds of living witnesses. Slut was bred in, and was of that sort which maintain themselves in the New Forest without regular feeding, except when they have young; and then but for a few weeks; and was given, when about three months old, to be a breeding sow, by Mr. Thomas, to Mr. Richard Toomer, both at that time keepers in the forest. From having no young, she was not fed, or taken very little notice of, until about eighteen months old; was seldom observed near the lodge, but chanced to be seen one day when Mr. Edward Toomer was there. The brothers were concerned together in breaking pointers and setters, some of their own breeding, and others which were sent to be broke by different gentlemen: of the latter, although they would stand and back, many were so indifferent that they would neither hunt nor express any satisfaction when birds were killed and put before them. The slackness in these dogs first suggested the idea, that by the same method any other animal might be made to stand and do as well as one of those huntless and inactive pointers. At this instant the sow passed by, and was remarked as being handsome: R. Toomer threw her a piece or two of oatmeal roll, for which she appeared grateful, and approached very near; from that time they were determined to make a sporting pig of her. The first step was to give her a name, and that of Slut (given in consequence of soiling herself in a bog) she acknowledged in the course of a day, and never afterwards forgot. Within a fortnight she would find and point partridges or rabbits, and her training was much forwarded by the abundance of both which were near the lodge. She daily improved, and in a few weeks would retrieve birds that had run, as well as the best pointer; nay, her nose was superior to any pointer they ever possessed, and no two men in England had better. They hunted her principally on the moors and heaths. Slut has stood partridges, black game, pheasants, snipes, and rabbits in the same day; but was never known to point a hare. She was seldom taken by choice more than a mile or two from the lodge, but has frequently joined them when out with their pointers, and continued with them several hours. She has sometimes stood a jack-snipe, when all the pointers had passed by it: she would back the dogs when they pointed, but the dogs refused to back her until spoken to; their dogs being all trained to make a general halt when the word was given, whether any dog pointed or not, so that she has been frequently standing in the midst of a field of pointers. In consequence of the dogs not liking to hunt when she was with them (for they dropped their sterns, and showed symptoms of jealousy) she did not very often accompany them, except for the novelty, or when she accidentally joined them in the forest. Her pace was mostly a trot, was seldom known to gallop, except when called to go out a shooting; she would then come home off the forest at full stretch, (for she was never shut up but to prevent her being out of the sound of the call or whistle when a party of gentlemen had appointed to see her out the next day, and which call she obeyed as readily as a dog,) and be as much elated as a dog upon being shown the gun. She always expressed great pleasure when game, either dead or alive, was placed before her. She has frequently stood a single partridge at forty yards distance, her nose in a direct line to the bird: after standing some considerable time she would drop like a setter, still keeping her nose in an exact line, and would continue in that position until the game moved; if it took wing, she would come up to the place, and put her nose down two or three times; but if a bird ran off, she would get up and go to the place, and draw slowly after it; and when the bird stopped, she would stand as before. The two Mr. Toomers lived about seven miles apart, at Rhinefield and Broomey Lodges. Slut has many times gone by herself from one lodge to the other, as if to court the being taken out shooting. She was about five years old when her master died; and at the auction of his pointers, &c. was included in the sale, and bought in at ten guineas. Sir H. Mildmay having expressed a wish to have her, she was sent to Dogmersfield Park, where she remained some years: she was at last in the possession of Colonel Sikes, and was then ten years old, had become fat and slothful, but would point game as well as before. When killed she was at Bassilden-house. Slut weighed 700 lbs. Her death, to those who possess common feelings of humanity, appears (if one may use the expression) at least animal murder: it would have cost but a trifling sum to have fed and sheltered her in the winter, and the park would have supplied her wants during summer at no expense." My reader may perhaps think that I have here occupied too much of his time in endeavouring to convince him of the tractableness and docility of swine, and that such is quite unnecessary in describing the management of these animals, which was the only thing he expected or looked for in this treatise. But once having removed the prejudice entertained, that such animals cannot be profitable, from the impossibility of making them graze and feed quietly like other animals, and that their natural disposition is to do mischief; such treatment will naturally follow as to render the management of them almost complete, for no part of the farmer's stock requires less nursing, doctoring, or attention in feeding than they do; but this surely does not the less entitle them to that share of attention which must be bestowed upon any kind of stock expected to pay for keeping. Let, therefore, such an unwarrantable prejudice be completely removed from the breast of every one who expects to be at all benefited by the keeping of such a stock; and let no such unprecendented idea, as that this species of animal is unmanageable, deter the inexperienced from sharing of the profits of a well-managed swine stock: for if these animals can be converted into ponies by schoolboys, and into pointers by gamekeepers, may not a sensible painstaking farmer train them to feed quietly, and behave themselves after they are satisfied? But allowing that swine are naturally of a cross, ravenous, and rambling disposition, cannot these be overcome by having proper attendance, secure conveniencies, and a sufficiency of suitable food bestowed upon them throughout the year? When such attention is given, no kind of live stock will prove so profitable to the farmer, particularly if the number kept be proportioned to the quantity of offal about the farm, and demand which may be had for them. It is a general remark that too many swine about a farm are unprofitable: this is certainly true, in so far as it is connected with the general treatment or neglect which they receive; but in places where any thing like attention is paid to them this doctrine is quite reversed; for in many places, particularly in Dumfries-shire and Norfolk, the farmers will tell you that, were it not for their swine, they could never pay their rents:* the cottagers in the former county depend solely on their pigs to pay the rent of their dwellings; and so sensible are they of the profit arising from these animals, that I have frequently seen them purchase potatoes, and even corn, at a very high price, to make them fit for the market. That swine are a profitable stock, when properly managed, requires only prejudice to be laid aside, and a fair trial made to prove the fact. A certain quantity of them can be kept to advantage in almost every situation; but to most profit at distilleries, corn mills, arable farms, and even in grazing districts, where the dairy is carried on to any extent. The refuse about such places, in most cases, would be entirely lost were it not for these animals; even the best of the produce cannot be consumed upon farms to a better account than when given to pigs, if their feeding and other management is carried on systematically. The superiority of the manure which they produce is, of itself, an object worthy of the farmer's attention. However, the profit and convenience of these animals more chiefly consist in their carefully gathering up and readily devouring such food as would be rejected and trampled under foot by other animals, and which to them is a feast. The small capital that is sunk in such a stock when compared with others, the shortness of time requisite in making them ready for a market, the quickness and easy expense at which a stock can be raised when an increase of demand takes place, and the small loss that attends the reducing of such a stock when a want of demand dictates the propriety of it, are certainly inducements for the keeping of such a stock which ought not to be overlooked.

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* Redkirk, in the parish of Gretna Green, Dumfries-shire.

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* It is quite general in Dumfries-shire for the farmers to pay one half-year's rent from their pigs.

It would appear that swine had become domesticated, and kept in large herds in various districts of Britain at a very early period: but as it is more the management of the hog than the history of it which I have at present in view, let therefore the following remarks here suffice for the historical part; and for such of my readers as may not yet have read the natural history of the hog, they will find it minutely and interestingly given in Goldsmith's Natural History. It appears that, about 2673 years ago, a numerous herd of swine was kept by a British prince in the neighbourhood of Bath; to whom, if the following story can be credited, we owe the discovery of the medicinal qualities of the hot springs there. "Baldred, eldest son of Lud Hudibras, (then king of Britain) it is said, having spent eleven years at Athens in study, came home leprous, and was in consequence confined, to prevent the infection of his disease. Having effected his escape, however, he went very remote from his father's court, into an untravelled part of the country, and offered his service in any common employment. He entered into service at Learwick, a small village three miles from Bath, where his business was to take care of pigs, which he was to drive from place to place for their advantage in feeding upon acorns, haws, &c. While at his usual employment one morning, part of the drove of swine, as if seized with a frenzy, ran down the side of the hill into an elder-moor, till they reached the spot of ground where the hot springs of Bath now boil up, and from thence returned covered with black mud. The prince being of a thoughtful turn, and very solicitous to find out the reason why pigs, that wallowed in the mire in summer to cool themselves, should do the same in winter; at length he perceived a steam arise from the place where they had wallowed, and making his way to it, found it warm. Having thus satisfied himself that it was for the benefit of the heat that the pigs resorted thither, he observed that, after a while, they became whole and smooth from their scurfs and eruptions by often wallowing in this mud, Upon this he considered within himself why he should not receive the same benefit by the like means; he tried it with success, and finding himself cured of his leprosy declared who he was. His master, though incredulous at first, being at last persuaded to believe him, went with him to court, where he was owned, and upon succeeding his father he erected the baths."* But though swine were kept so early in the south of England, it appears, from the following anecdote, that they were very little known in the north of England and south of Scotland, even in the last century.

" Within the last century, (probably about ninety years ago,) a person in the parish of Ruthwell, in Dumfries-shire, called the " Gudeman o' the Brow," received a young swine as a present from some distant part, which, from all the information I could get, seems to have been the first ever seen in that part of the country. This pig having strayed across the Lochar into the adjoining parish of Carlavric, a woman, who was herding cattle on the marsh by the sea-side, was very much alarmed at the sight of a living creature that she had never seen nor heard of before, approaching her straight from the shore, as if it had come out of the sea. She ran home to the village of Blackshaw screaming, As she ran it ran snorking and grunting after her, seeming glad it had met with a companion. She arrived at the village so exhausted and terrified, that before she could get her story told she fainted away. By the time she came to herself a crowd of people had collected to see what was the matter, when she told them that 'there was a deil came out of the sea with two horns in his head, (most likely the swine had pricked ears,) and chased her, roaring and gaping all the way at her heels, and she was sure it was not far off.' A man called 'Will's Tom,' an old schoolmaster, said if he could see it he would 'cunger the deil,' and got a Bible and an old sword. It immediately started up at his back and gave a loud grumph, which put him into such a fright that his hair stood upright on his head, and he was obliged to be carried from the field half dead. The whole crowd ran some one way and some another; some reached the house tops, and others shut themselves in barns and byres. At last one on the house top called out it was 'the Gudeman o' the Brow's grumphy,' he having seen it before. The affray was settled, and the people mostly reconciled, although some still entertained frightful thoughts about it, and durst not go over the door to a neighbour's house after dark without one to set or cry them. One of the crowd, who had some compassion on the creature, called out, 'Give it a tork of straw to eat, it will be hungry.' Next day it was conveyed over the Lochar, and it seemed to find its way home. It being near the dusk of evening, it came grunting up to two men pulling thistles on the farm of Cockpool. They were much alarmed at the sight, and mounted two old horses they had tethered beside them, intending to make their way home. In the mean time the pig got between them and the houses, which caused them to scamper out of the way, and land in Lochar Moss, where one of their horses was drowned, and the other with difficulty relieved. The night being dark, they durst not part one from the other to call for assistance, lest the monster should find them out and attack them singly; nor durst they speak above their breath for fear of being devoured. At day-break next morning they took a different course, came to Cumlongan Castle, and made their way home, where they found their families much alarmed on account of their absence. They said that they had seen a creature about the size of a dog, with two horns on its head, and cloven feet, roaring out like a lion, and if they had not galloped away it would have torn them to pieces. One of their wives said, 'Hout man, it has been the Gudeman o' the Brow's grumphy; it frightened them a' at the Blackshaw yesterday, and poor Meggie Anderson maist lost her wits, and is aye out o' ae fit into anither sin syne.' The pig happened to lie all night among the corn, where the men were pulling thistles, and about day-break set forward on its journey for the Brow. One Gabriel Gunion, mounted on a long-tailed grey colt, with a load of white fish in a pair of creels swung over the beast, encountered the pig, which went nigh among the horse's feet, and gave a snork. The colt, being as much frightened as Gabriel, wheeled about, and scampered off sneering, with his tail on his riggin, at full gallop. Gabriel cut the slings, and dropt the creels; the colt soon dismounted his rider, and going like the wind with his tail up, never stopped till he came to Barnkirk Point, where he took the Solway Frith, and landed at Bowness, on the Cumberland side. As to Gabriel, by the time he got himself gathered up, the pig was within sight, he took to his heels, (as the colt was quite gone,) and reached Cumlongan wood in time to hide himself, where he stayed all that day and night, and next morning got home almost exhausted. He told a dreadful story! The fright caused him to imagine the pig as big as a calf, having long horns, eyes like trenchers, and a back like a hedge-hog. He lost his fish, the colt was got back, but never did more good; and as to Gabriel he soon after fell into a consumption, and departed this life about a year after. About this time also a vessel came to Glencaple quay, a little below Dumfries, that had some swine on board, most likely for the ship's use. One of them, having got out of the vessel in the night, was seen on the farm of Newmains next morning. The alarm was spread, and a number of people collected. The animal got many different names, and at last it was concluded to be a brock. Some got pitchforks, some clubs, and others old swords, and a hot pursuit ensued: the chace lasted a considerable time, owing to the pursuers losing heart when near their prey, and retreating. Rob's Geordy, having rather a little more courage than the rest, ran ' neck or nothing' forcibly upon the animal, and run it through with a pitchfork; for which he got the name of ' stout-hearted Geordy' all his life after. There is an old man, nearly a hundred years of age, still alive in the neighbourhood where this happened, who declares that he remembers of the Gudeman of the Brow's pig, and the circumstances mentioned; and he says it was the first swine ever seen in that country." *

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* In one of these baths there is still seen a statue of King Baldred, which was erected in 1699, under which is the following inscription on copper: " Baldred, son of Lud Hudibras, eighth King of the Britons from Brute, a great philosopher and mathematician, bred at Athens, and recorded the first discoverer and founder of these baths, 863 years before Christ."

But I shall now return to what is more immediately connected with this treatise, viz. proper management of swine; but in order to make suitable selections, I shall first take a retrospective view of some of the distinct breeds indiscriminately dispersed over the kingdom, and notice the peculiarities of some and the advantages of others now mostly in repute.

From the numerous kinds and varieties of swine which are now spread over a great part of the globe, it would appear, if even possible, to be a very difficult task to trace out the original breeds. I shall, however, endeavour to insert in the following synopsis such as are generally conceived to be distinct breeds, most under notice, and such as are held in the highest estimation.

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* Henderson's *Treatise on Swine*, *&c.* second edition, p. 15.

Synopsis of the different Breeds of Swine in Great Britain.

BREED.	CHARACTERISTIC MARKS.				PECULIAR ADVANTAGES OR DISADVANTAGES.		
	Colour.	*Ears.*	*Legs.*	*Carcass.*	*Flesh.*	*Fatten.*	*Proper Age for fattening.*
Large Sized Breed.							
Gloucester . .	White.	Medium Size.	Long.	Thin and ill formed.	Coarse grained.	Slowly.	From 12 to 18 months.
Hampshire . .	Do.	Do.	Medium Length.	Long Neck and Body.	Do.	Kindly.	Do.
Northampton .	Do.	Very large.	Very short.	Medium Shape.	Do.	Slowly.	Do.
Shropshire . .	Do.	Do.	Do.	Do.	Do.	Medium.	Do.
Rudgwick . .	Do.	Medium.	Medium.	Large Shape.	Do.	Very kindly.	From 1½ to 2 years.
Woburn . . .	Black and White spotted.	Do.	Short.	Well shaped.	Medium Quality.	Kindly.	From 12 to 15 months.
Middle Size.							
Berkshire . .	Reddish, with Black Spots.	Large, pending over the eyes.	Do.	Well proportioned, small Bone.	Fine Quality.	Very kindly.	From 9 to 12 months.
Black Wire-haired	Black.	Medium, sharp Points.	Do.	Do. do.	Do.	Do.	Do.
Small Sized Breed.							
Chinese . . .	Black, White, Tawny.	Small.	Very short.	Thick Neck, Body well proportioned, small Bone.	Very delicate.	Do.	From 6 to 9 months, if for Pork 4 months.
Swing-tailed .	Various.	Medium.	Medium.	Small Bone.	Fine Quality.	Kindly.	From 9 to 10 months.
Highland, or Irish	Do.	Small Prick Ears.	Short.	Small, ill shaped, with Bristles erect.	Very delicate.	Slowly.	From 6 to 9 months.
Horse-hoofed .	Do.	Do.	Do.	Small, well proportioned, Hoof not cloven.	Do.	Medium.	Do.

NOTE.—Most of the above Breeds are to be found in their original purity in the different districts from which they take their name, but are now widely dispersed throughout the kingdom.

REMARKS ON THE PRECEDING TABLE.

Among all the large white breeds taken notice of in the synopsis, none deserves the particular attention of the farmer, except the Hampshire and Rudgwick, both of which will feed to a great weight in a kindly manner; but particularly the latter, which is supposed to be the heaviest breed in existence, especially when at full growth and thoroughly fat. They are a peculiar breed, reared at a village of the same name, on the confines of Surry and Sussex. All the other kinds above alluded to, although large, do not weigh in proportion to their appearance, nor adequately to the food which they consume, consequently are losing repute and giving way to more profitable kinds. The Gloucester breed has two wattles or dugs pending from the throat, and is supposed to be the original breed in Britain. But those which seem now to attract the public most, are the large spotted Woburn, the Berkshire, the black wire-haired, and the Chinese breed; on each of which I shall here make some additional remarks.

SPOTTED WOBURN BREED.

This is a new variety introduced by the late Duke of Bedford, noted for its kindly disposition to fatten, and attaining to a considerably greater weight than any other within a given period of time. They are very hardy and particularly prolific, and are well calculated for the system of curing bacon, or selling young pigs off their dams.

BERKSHIRE BREED.

This breed has now become an universal favourite, from its ready disposition to fatten at almost any age, being equally well calculated for porking or curing of bacon. They are now quite general in England and many parts of Scotland, and evidently thrive better with common fare or when left to themselves, than any other breed equal to them in weight, and when fed off weigh* more, in proportion to their size and the quantity of food consumed, than any other: it is in this particular that they excel most and are very properly become such favourites, for they will no doubt thrive and do well with a certain quality and portion of food, which would scarcely keep some of the other large kinds alive.

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* Mr. Young, in one of his tours, gives an account of a Berkshire pig, which was fed to eighty-one stone. Mr. Culley mentions a pig as having been killed by James Washington, butcher in Congleton in Cheshire, which mea-

BLACK WIRE-HAIRED BREED.

This breed is chiefly all black, with sometimes a little white about the throat and feet, the bristles are strong and thick set, and, when compared with some other pigs, have as striking a difference between their coats as there is between a well-haired West Highland bullock and a north country *slape-skinned* one. There is a similar species which is grey in the colour, and the same marks of white sometimes upon them. Although this breed has now formed itself into a distinct one, yet it is evidently a cross between some of the large breeds and the Chinese black breed. They are to be found in great abundance in Dumfries-shire, but seem to prevail most in the lower parts of Annandale, where they are thought to excel all others, for yielding most profit in the shortest time and for the quantity of food consumed; being likewise equally well adapted for porking or making into bacon, easily kept in summer, easily made fat and at almost any age: when fat at twelve months old, their average weight is from sixteen to twenty stone.

CHINESE BREED.

This breed, although mostly black, are to be found of various colours, viz. white, tawny, or reddish, and brown; it is, however, supposed that white is the original colour. They are far superior to any of the other small breeds from their readiness to fatten; indeed, they may be said to be always ready for killing, provided they are not starved, as they will subsist upon little or nothing, and become fat with a smaller allowance of food than any other species of hogs yet known. Although their bacon is esteemed by epicures,

sured from the nose to the end of the tail three yards eight inches, and in height four feet five inches and a half; and weighed eighty-six stone eleven pounds avoirdupois.

yet they are much better calculated for being used as pork, especially when young and not too fat, for which purpose a few of them ought to be kept about every gentleman and farmer's premises, although they are conceived to be more troublesome than most other breeds. The other three small breeds noticed in the synopsis are equally delicate in their flesh as the Chinese, (indeed are accounted superior by those unto whom the sight of the fat of bacon and pork is alone sufficient and satisfying to the appetite,) viz. the swing-tail, which is a hardy well-proportioned animal, and feeds to a great weight in proportion to its size: and the Highland or Irish breed, (with their erect bristles from head to tail,) not good thrivers, which, connected with their diminutive size, must prevent them from having the least claim to the name of a profitable stock; but the delicacy of the pork and hams cured from them will still entitle them to a corner of the epicure's table. Although according to the present treatment and feeding of hogs, they may in point of profit stand last in the list, yet if all the different most approved of breeds were turned out at large with them in a wild mountainous district, and allowed solely to depend upon their own shift, I question much if a few years of such treatment would not reverse the opinion and turn the erect bristle to the top of the list; for it does not follow that the animal which will thrive best upon good food in a sheltered situation, will likewise do so upon bad food in an exposed one. The Highland pig may therefore even have its advantages in some peculiar situations. The horse-hoofed pig seems too diminutive in size ever to become a general favourite, and is more a subject of curiosity than profit.

SECTION II.

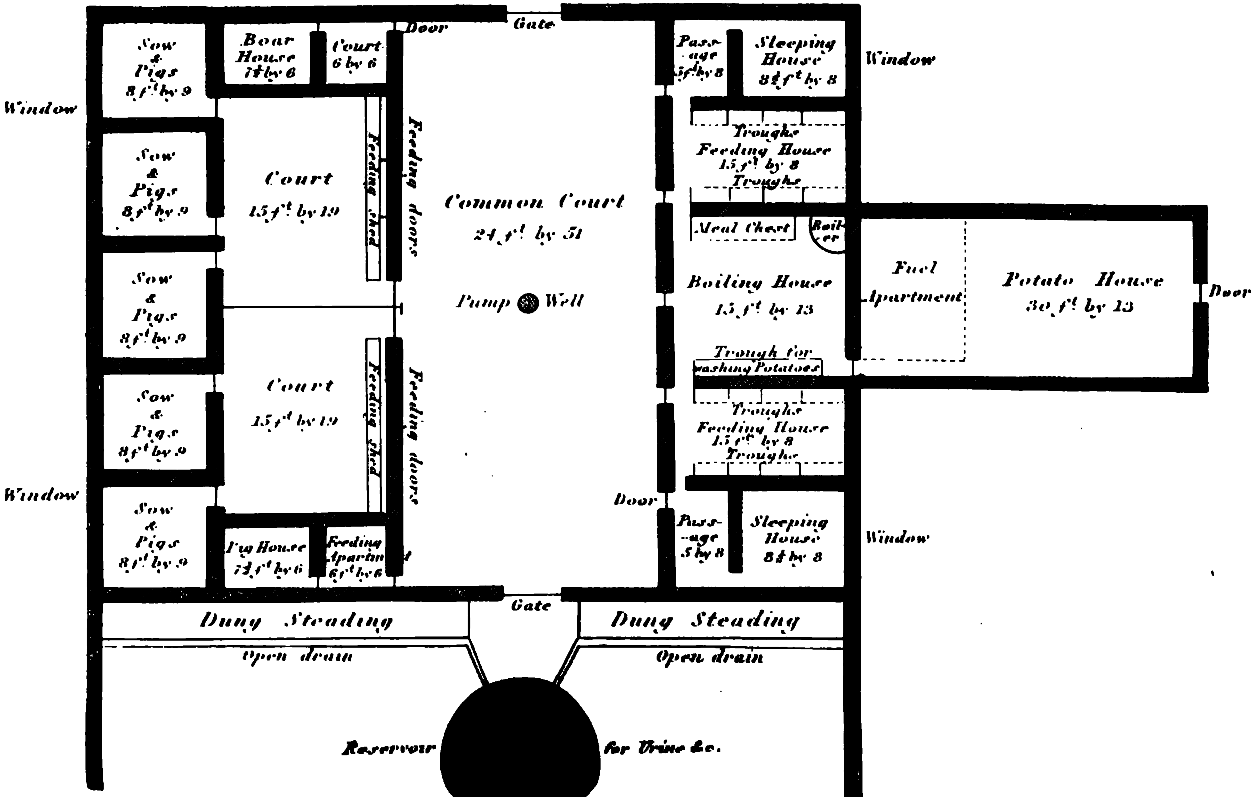
GENERAL REMARKS PREPARATORY TO THE SELECTING AND PROPER MANAGEMENT OF A SWINE STOCK.

Having, in the introductory view and table of synopsis, given such a description of this species of stock as will, I trust, enable the inexperienced to make a selection suitable to their food and intended market; it may, therefore, be readily inferred that in situations where there is abundance of food throughout the year, (such as about distilleries, mills, &c.) and the demand principally for bacon, some of the large kindly feeding breeds, such as the Hampshire, Rudgwick, Woburn, ought to have the preference; and in such situations where selling young pigs may be by some followed as a system by itself, the Woburn will be found to be the most prolific and best nurses. But when the provisions are more limited, as is the case during summer upon some farms or by some keepers of swine, and the demand partly for pork and partly for bacon; the Berkshire, and black wire-haired with their variety, will be found infinitely superior. When delicacy of flesh and porking alone are the requisites, the Chinese, swing-tail, and their varieties must decidedly have the preference. But in selecting a proper breed of whatever kind, the nearer the shape approaches to the following, the better, viz. a short nose, full plump cheeks, ears pending forward and pointing towards the nose, thick short neck, deep sides and full quarters, thin skin and short legs; in short, a fine bone supporting a moderately long but plump round-looking carcass. The first and grand object to be considered relative to the proper management of this stock is to provide suitable and substantial conveniencies, which being done with a plentiful supply of proper food at all times and seasons, accompanied with a strict observance of cleanliness in every respect, will, if not complete the management, render it smooth and easy; whereas if the above requisites are a-wanting, all other care and attention toward this stock will prove fruitless and vain. Should the breeding, rearing, and feeding, be carried on upon a large scale, proper conveniencies must be erected, the following description of which is given by Mr. Young: that a piggery "must be in a circle, or it must fail in convenience. In the centre, the boiling or steaming house, with a granary for corn, meal, bran, &c. a range of cisterns in divisions around it, for receiving immediately from the copper or steam apparatus, and also by tubes from the granary; around these a path, then the fence, wall, or paling, in which the troughs with hanging lids, for supplying food directly from the cisterns on one side, and for the hogs feeding on the other; a range of yards next, and another of low sheds beyond; and last of all, the receptacle for dung. The potato stores or pyes should be at one point near to the entrance, and water must be raised to the coppers and cisterns at once by a pump, a trough, or other conveyance, from the dairy to the cisterns, for milk, whey, &c." A piggery, according to Mr. Young's plan, would evidently appear to be most desirable and convenient; only, as it may be conceived to be too expensive to become of general use, I shall here insert a description of a piggery, which I occupied for many years, and which afforded me the utmost satisfaction. It was planned and built by my father, whose experience in the management of this stock was very considerable, having carried it on for a series of years upon a more extensive and systematical scale than any other whom I have either seen or heard of. The following is a description of the above piggery. (See Henderson's Treatise on Swine, &c. p. 35.) "My conveniences at present, which plan I can recommend to the public, are as follow: A house thirty by fifteen feet, made with four doors, which open outwards, (the litter in the inside would prevent their opening in the usual way,) and three partition walls through the house, viz. a wall betwixt each door, which divides the house into four apartments. The two in the middle I adapt for eating rooms, and the others for sleeping apartments, having an inner door betwixt each eating and sleeping apartment. By this plan the keeper gets their eating rooms swept out, their mangers cleaned, and their food put in, without any incumbrance from the swine, as they are all at rest. When this is done, unbolt the door and ring the dinner bell. I might add, that a division wall would be proper through each sleeping apartment, with an open door in it. The apartment next to the backside of the house is to hold the litter where the family sleeps. The apartment next the front of the building, which they walk through to their eating room, will serve as their necessary, as they are so cleanly that they will not defile their bed. The latter place may be the smaller of the two. The most convenient manger for their food is as follows: Let it be as long as the house is wide, and fixed against the middle wall; it may be similar to that of a horse manger, only not so deep, and must be divided into twelve divisions by partition boards. Let each of these boards be cut four feet in length or height, and a little broader than the manger is wide; fix them to its bottom, and nail a board or thin plank over the top of these fixtures. This method prevents the swine getting into the manger and destroying their food. In this way the number before mentioned will feed as quietly and thrive as well as if there were only two or three together.

Before every meal the manger ought to be washed, and the room clean swept out. A little clean litter every night will make the family comfortable. I have at present thirty young swine that sleep and eat together, and I never remember of having any that throve so well. Each of the above-mentioned sleeping and eating rooms can be divided into two, in case they are required for sows and pigs, and the partitions again removed at pleasure. I would recommend a still further improvement to those who may have their conveniences yet to build, viz. five apartments in place of four. The middle apartment to have a fixed boiler in it to make ready their victuals, with a chest to hold meal, bran, barley-dust, &c. with an eating house at each end of the boiling house, and the sleeping apartments adjoining. The sleeping apartments should be dark, close places, which is a great advantage for fattening. When swine are allowed to ramble up and down, even after a good meal, the food has not the same effect. Every apartment ought to be paved, so that they can be kept clean and dry. There should be a square, or yard, formed by the huts or other buildings for sows; and that square likewise ought to be paved. If about half an acre of land could be conveniently enclosed with a stone dyke, adjoining the houses, it would be of great use for the store pigs and sows. I have had, in the course of more than thirty years' practice, many different plans of swine houses; but have found what I have now described greatly superior to any of them. When this plan is completed it will en-

PIGGERY

69½ feet by 54 over the walls, allowing 1½ foot for each wall or division.



able the breeder and feeder to manage these animals properly; which, I hope, will be a means of removing a part of the prejudice entertained against them, and of rendering them a more valuable sort of live stock than otherwise, if ill accommodated and inattentively managed."[*] But the annexed plan will better illustrate that now described, as it is nearly the same, with some little additions subjoined, which I conceive to be improvements.

REMARKS ON THE PRECEDING PLAN.

Moveable wood conductors should be placed to carry the water from the pump-well in the centre of the court so as to wash out the troughs, fill the boiler, or wash potatoes in the trough in the boiling house; and covered drains should be made to communicate with those places, to carry the water into the reservoir, as likewise all the urine from the different places of the piggery. The feeding shed allotted for the sows and pigs, and which may be applied for any other purpose of feeding, must be made in width and height sufficient to keep the largest swine dry when feeding, and troughs placed to receive the food in at the feeding doors.

The preceding plan is preferable to that described by Mr. Young, or any other which I have yet seen, on account that it can more conveniently be increased or diminished according to the number of swine kept; as one of the range of buildings on the side of the common court will form a sufficient piggery of itself, with very little alteration when the stock kept is not very large, or even the half of one of them if the number is small; another advantage attending this plan is, that the divisions in the interior may all be made of wood, (of such a height as will keep the stock separate) and so as to be moved if necessary; when the whole or any part of the building can easily be converted into other purposes. It must be observed, in the erecting of such buildings, to have as much descent from them to the reservoir as will keep the houses and courts always dry. Should the number of apartments allotted for sows and pigs be too many, one half or any part of them will answer equally well for the store pigs. Such conveniencies, with methodical treatment, will render the management of swine easy and profitable, which would otherwise be troublesome and attended with loss.

SECTION III.

ON BREEDING.

Having selected males and females of a suitable kind and proper age and condition for breeding;* the first thing then to be considered is to put the sow to the boar, so as to bring at proper seasons two litters of pigs within the year. The times of farrowing should not therefore be later than the first weeks of February and August, consequently the sow ought to be admitted to the boar in the first weeks of October and April preceding; for if the second litter is later than August, the pigs will be too young to endure the cold of winter without receiving an irrecoverable check of growth and thriving. When a sow is with pigs she ought to be fed with nutritious food, (such as boiled potatoes and meal, the refuse of the dairy or kitchen) in order that she may afford her offspring better nourishment. "A sow, when with young, ought not to be entirely confined to a hut, nor allowed to travel too much; only reserve her liberty to walk about at pleasure in the swine yard, or any convenient place, where she can do no damage; when half way gone with pigs she should not be allowed to sleep with a number of swine, at least not be permitted to lie throng, as she is but too apt to have the young in her belly killed with the feet of her bedfellows.

It may not be unnecessary to remark that a sow goes with young 112 days, or sixteen weeks; not above a day over or under that time. A few hours previous to her farrowing, she will be observed carrying straw, &c. in her mouth, to make a bed with. It must be carefully observed not to have much litter, or long straw, in her apartment when bringing forth her young, and even for a few days after; as having too much roughness about her would endanger covering some of the pigs, so that their dam could not perceive where they were, and consequently lie down upon them, although she is very careful to push what part of them she sees before her with her snout, before lying down."* She ought to be allowed a separate apartment for ten days previous to farrowing; and as it sometimes happens at the first farrowing that a young sow will eat her progeny, she ought to be narrowly watched at that period; and if any such attempts are made, the pigs should be put into a tub (with some dry straw in it) just as they are farrowed, and allowed to remain until perfectly dry. Give the sow a plentiful supply of food in a warm liquid state, after which the pigs may be returned again to their unnatural mother: but in order to insure safety, let their backs all be previously spunged with a lukewarm infusion of aloes and water, which will prevent her from destroying them. It is somewhat singular that the strongest always sucks the teat next the fore spall, and so on until the weakest is put to the last teat next the hind quarters. The young fry now being all set to work, the breeding is finished and the rearing commenced.

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* It must be remarked that, although good condition is requisite to promote coition, yet a sow too fat at this period will never have many pigs, and frequently none at all. For the proper age see table, Introduction.

SECTION IV.

ON REARING.

By always keeping in mind the following particulars, from the time of farrowing until swine are fed off, will, in a general point of view, take in the leading features requisite for turning the rearing and feeding system to the best account, viz. that they be constantly supplied with a sufficiency of clean seasonable food; never permitted to lie down in a cold, damp, or dirty bed; but always be supplied with clean litter, previously removing all filth from about their dwelling; never allowed to roam at large without being put into some well-secured field, or accompanied with some attentive attendant; never (whether in the house or out of it) to be without rings in their noses;* which not only prevents their destroying grass fields, and committing other depredations, but makes them feed and rest more quietly,—which is so essential to promote their improvement: in short, it must be admitted, that, in order to make the most of a breeding sow, she ought always to be either in pig or giving suck; so will it be found, that, in order to make the most of swine in general, they should never be permitted to go to bed with a hungry belly. But so as to complete the thorough management of this stock, I shall proceed to give some more minute indispensable particulars relative to rearing and feeding—taking the different stages of life in order; but never losing sight of the above general remarks. The sow ought to be well fed when giving suck, as it is a time when she will have a craving appetite for both meat and drink,—which, if duly satisfied, will keep both her and pigs in good condition, a most essential point to be attended to; for if the former is allowed to get into a state of poverty, it will require a double quantity of food and time to regain her condition; and the latter, if once in such a state, will not only require extra feeding and time before they can be brought to market, but will never make such good swine as they would have done, had they always been kept in good condition. To guard against such evils, therefore, let the sow and her progeny be fed two or three times a day with milk and wheat bran, or something similar; water, a little warm, may be substituted for milk when it is scarce or too valuable; the mixture, of whatever nature, ought not to be thick, but should be more of the nature of a drink than any thing else. After the pigs are about ten days old, if the weather is mild, they ought to be allowed to stretch their legs a little once a day in an open court attached to their house,—during which period the sow may be turned out from them, which will contribute very materially to the supply of milk; but care must be taken to avoid the sow's remaining out from them all night. Feeding as above will be found very beneficial in almost every case; but more materially when a sow brings forth more than she is able to support, which is not unfrequently the case. It is likewise of great importance to accustom pigs with food when sucking, as such will prevent their taking the 'weaning brash.' When the pigs are about a month or five weeks old, such as are not intended for breeding should be castrated or spayed:* this operation ought to be performed, at all events, so as the pigs may be fully recovered before weaning; and previous to its being executed, the pigs (particularly the females) should be as empty as possible, and not exposed to cold, nor allowed too much food for a day or two thereafter. Should the sow and pigs have been kept warm and dry, and well supplied with drinks moderately warm, and mixed with a little meal, or wheat bran, &c. the pigs may in general be weaned when six weeks old; but if they have been neglected they will require to suck two months, and even then will not be in such good condition as if they had been well fed for six weeks. If the pigs are intended for sale, this is the time to take them to market, having then a better appearance than they will have for many weeks after weaning. When the pigs are taken from the sow, she must be well fed for ten days with boiled potatoes and meal, oats, &c. which will soon act as a stimulus for coition, so that the proper season for bringing forth her young may not be lost. The pigs must, after weaning, (whether in the possession of the breeder or purchaser) be regularly fed three times a day with similar food to that recommended for them while sucking; and in a few weeks they will begin to eat raw potatoes or grain, &c. The refuse and washings of a kitchen or dairy are particularly well adapted for pigs, and ought to be carefully collected for that purpose; and as potatoes are the best feeding roots for swine,[*] it will therefore be necessary to be provided with as many of them as will serve the stock (however large) throughout the year: however, a small proportion of them will suffice during summer; for if pigs receive only a sparing breakfast of this root, or occasionally a little barley dust, wheat bran, or any other refuse of grain mixed with a little water, before being sent to the grass or clover field to pasture until night,[†] and then similar treatment on their return for supper, they will be kept in good condition until the time of close feeding commences; but for such as are intended to be fed off the ensuing winter, new potatoes and other vegetables ought to be given them unsparingly as soon as they are to be had. When the harvest is finished, the young stock may be allowed to range at large among the fields, to gather up the fragments of corn, &c. that would otherwise be entirely wasted; their mothers may likewise be granted the same privilege, provided they are not put up to feed. In some countries it is common to allow swine to go upon the new-sown wheat when the ground is very dry and loose, which benefits it very much by the trampling of their feet; but such liberties should not be granted to this stock without a person to attend them, and their noses insured from digging, as has already been recommended. During such promiscuous treatment, it will however be proper to let each kind or size sleep in their respective apartments, as it is more healthy for such animals to be kept warm, with a plentiful supply of clean litter, than to be smothered up, lying in large heaps, as they generally do when a number are put into one house with a scanty supply of bedding.

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* Henderson's Treatise on Swine, &c. p. 20.

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* The usual method of ringing swine is to put one or more pieces of wire through the gristly part of the snout, by first making a hole with an awl, and then put through the wire; double the ends together, and give it a few twists with a pair of pincers, to prevent its coming out; this is, however, troublesome, and requires to be often renewed: it is now, however, superseded by an improved method adopted by Mr. Tubb, which is to pare off, with a sharp penknife, the gristle on the tops of the noses of young pigs.

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* I might have here attempted to explain the method of spaying; but as it cannot be properly understood without seeing the operation performed, I deem it more proper to decline it.

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[*] Swedish or yellow turnips are a good substitute for potatoes when they are scarce. The turnips ought to be cut down among some oats or meal, until the pigs are accustomed to eat them.

[†] Where large stocks of swine are kept, some fertile spot, in good condition, ought to be sown with clover, without ryegrass, so as to come early, and support the pigs until the second crop of clover is ready after the hay.

SECTION V.

FATTENING.

Swine are fed in various ways, and for various purposes, viz. pigs for roasting; shots, or half grown swine, for using as pork or pickling; and those arrived at full growth for curing as bacon. The roasting pig answers best to be taken from the sow, of some of the small breeds; and as the porking or pickling system does not answer when the swine are too fat, it is generally such as are half fat in the end of harvest, or such as may have thriven badly during winter, and not good enough for curing as bacon, that are applied to this purpose. Feeding for bacon, however, is quite different, as swine for this purpose cannot be too fat; for the thicker the sides are when cured, they will bring a better price per stone, and consequently will weigh more. The best food for swine intended to be made into bacon is boiled or steamed potatoes, with a small quantity of salt, and oat or pease meal mixed, with an occasional drink of meal and water. Having tried the steaming of potatoes,* I would give it decidedly the preference, as potatoes prepared in this manner will feed much quicker, and, from being quite dry, keep much longer from souring than such as are boiled. It must however be remembered, that the greatest profit in feeding swine is when they are in good condition, previous to their being put up to close feeding; for it is too general a practice to pay no attention to feeding swine until they are put up in November or December, when with a little attention having been paid to them previously, they might be as fat as they will be at the period when they must be killed for bacon, which would save about two months feeding,—a sufficient inducement for proper attention and feeding being bestowed in season. When put up to feed, great exactness is requisite as to the stated times of giving the food: three meals per day will be found sufficient if well timed. Great caution is likewise necessary in not giving such a quantity of food as may overload the stomach, and thereby cause a rejecting of it altogether. When such happens to be the case from this or any other cause, let such food as is left, after the animals seem satisfied, be instantly removed, and given to some of the young stock; the quantity afterwards given diminished, and the diet changed two or three times a week, by giving a few oats, barley, beans, or pease, &c. still using the precaution of never giving more of any thing than what the appetite will consume with a relish, which will be greatly promoted by always washing out the trough before any food is put into it. This is the key-stone to quick and advantageous feeding of pigs. In many cases it would be advisable and necessary to feed off the stock at twice, when one or more sows are kept, and the two litters already noticed are all intended to be fed off. The August farrowed pigs will be ready to put up to feed upon the first of October the following year, and be ready for market by the end of November, when the February farrowed pigs may be put up, and have time enough to be made fat before the season for curing bacon is finished. But to conclude: Whoever intends to be benefited by rearing or fattening of pigs, must never let them get low in condition, (which may easily be avoided by always keeping them with full bellies,) otherwise they will consume much more food than would be requisite to keep them in good condition, and even in some very poor cases, make them fat.

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* See note page 125.

SECTION VI.

DISEASES OF SWINE.

The diseases of swine are comparatively few to those incident to other domesticated animals; indeed if proper attention is paid to their food, warmth, and cleanliness, in the manner already recommended, they may be almost said to be free from diseases altogether; and even when neglected they are so few, and of such rare occurrence, as scarcely to be worthy of notice; for the stomachs of these animals are not only receptacles for the refuse of the kitchen, dairy, and all kinds of agricultural produce, but their constitution seems to be proof against the worst of treatment, which they too frequently receive. Let it be remembered, therefore, that proper treatment is the only preventive, and frequently the best cure for all the diseases which do attend them. I shall, however, briefly notice a few with which I am from experience only slightly acquainted.

WEANING BRASH.

This is a sickness or disease, which sometimes attacks young pigs when taken from their dam's milk, and put upon other food. It however more frequently seizes those which have had a plentiful supply of such fluid, so as to have prevented their occasionally tasting of their mother's repast, which would otherwise prove a good preventive to this disease.

Symptoms.—After being deprived of sucking, and having taken a few meals of some other provision, a dysentery generally takes place to a smaller or greater degree, according to the contrast of food, accompanied with a loathing of food, and followed by a sudden falling off in condition, the hair or bristles standing somewhat erect, and the animal upon the whole has a very sickly appearance.

Preventive.—The only and best preventive is to accustom the pigs to take a little food when sucking, such as a few boiled potatoes mixed with some refuse of the dairy, of an equal temperature with their mother's milk, to be continued for a week or two after weaning, and afterwards change the nature of their food by degrees.

Cure.—Keep the pigs warm, and feed them with such like food, and in a similar state and manner to that recommended for a preventive; but when the case is obstinate, a little new milk from the cow mixed with wheat bran will soon effect a recovery.

GARGUT.

This disease is an inflammatory affection of the udder or bag, being swollen with coagulated milk, occasioned sometimes from weak pigs not sucking properly at first, or when sows have a great flow of milk, and the pigs taken early from them. It is likewise said to arise from too rich feeding previous to farrowing, as also from sows being shut out all night from their pigs.

Preventive.—If a sow is in good condition, feed moderately before the time of farrowing. Immediately after that period see that the pigs are drawing the teats properly, and removing that stiffness of the bag which is then so general. If the sow appears to have much milk at the time of weaning, a little ought to be drawn (but not milked clean) every other day for about a week.

Cure.—Bathe the udder with camphorated spirit of wine, and squeeze out as much of the corrupted milk as possible; for pigs will not suck when the milk becomes vitiated. Attentively bathing, and milking three times a day, will in general soon effect a cure.

DISEASE OF THE LUNGS.

This disease is most frequently brought on by severe exposure to cold and wet.

Symptoms.—A dry husky cough, and great wasting away of the flesh.

Cure.—Take a little blood, and keep the patient warm and dry. Give a regular supply of liquid and cooling food, such as the refuse of the dairy mixed with barley meal or wheat bran. Nothing dry or of a heating nature must be given.

MEASLES.

This disorder exists chiefly in the throat, which is internally filled with small tumours, but sometimes appears externally upon the neck. The animal affected seems to have great debility, and soon gets much reduced in condition. The best method of effecting a cure, is to give small quantities of levigated crude antimony in the food.

MURRAIN, OR LEPROSY.

This disease would appear to be of the same nature as that with which the numerous herd kept by a British prince in the neighbourhood of Bath[*] was affected, and which cured themselves by wallowing in warm mire. The disease proceeds from an inflammatory diathesis, occasioned principally by hot weather.

Symptoms.—The head hangs down; breathing short and very hot; giddiness, with a discharge of matter from the eyes; and at a more advanced stage the skin becomes covered with white scales.

Preventive.—Keep the animals cool in the warm months of summer, avoiding severe exercise. Cleanliness is likewise indispensable.

Cure.—In the first stage take a little blood, by cutting the ear or tail. " Boil a handful of nettles in a gallon of small beer, then add half a pound of flour of sulphur, a quarter of a pound of pulverized aniseeds, three ounces of liquorice, and a quarter of a pound of elecampane. Give this liquid in milk at six doses; and keep the diseased animals on wholesome food." To remove the leprosy or scurf, wash with warm water and soap.

FEVER.

The most frequent cause of fever among swine proceeds from a surfeit.

Symptoms.—The animal hangs down its head; sometimes foams at the mouth; the eyes look heavy, and the whole body is hot, and trembles. These are generally accompanied with heavy groans, and a rejecting of food, with a great desire to drink.

Cure.—Take a little blood, and give a small quantity of sulphur and sweet oil. The bleeding must be repeated, should the fever not seem to abate.

MANGE, OR SCAB.

This is a cutaneous eruption, principally occasioned from want of cleanliness.

Symptoms.—A violent rubbing against every hard substance that is within reach, which tears off the head of the pustule, and produces a scab.

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[*] See page 245.

Cure.—This being a very infectious disease, animals so affected ought instantly to be removed to some separate apartment, and there to remain until a cure is accomplished. "Wash thoroughly with a strong soap-ley, and anoint with the following ungent, recommended by Dr. Norford. ('Annals of Agric.' vol. xv.) Incorporate one ounce of fine flour of sulphur, two drachms of fresh pulverized white hellebore, three ounces of hog's lard, and half an ounce of the water of kali, (as prepared in the shops) so as to form an ointment. This is to be rubbed in at one time, and is said to be sufficient for a beast of six or seven stone; and when properly applied, Dr. N. states that no repetition will be necessary, if the hog be kept perfectly clean after the cure is performed. In case there is a slight cough, he directs from half an ounce to one ounce and a half of crude antimony, according to the size of each animal, to be finely pulverized, and mixed with the food daily for ten days or a fortnight, when the swine will be perfectly restored. But if, from long neglect, the neck, ears, (especially in the large lop-eared hogs) or other parts become ulcerated, they should be anointed every third or fourth day with a little tar ointment, prepared by mixing equal parts of mutton suet and tar over a gentle fire, and straining such mixture while hot." See Complete Grazier, p. 215.

SECTION VII.

ON THE VARIOUS WAYS OF PREPARING PORK FOR USE OR MARKET.

From what has been briefly stated in the preceding pages relative to pigs, I trust that my reader will be afforded some assistance in the proper management of them; but where the rearing and feeding of pigs are carried on upon an extensive scale, and no demand for pork, (from want of bacon curers) recourse must then be had by the feeder to the pickling and curing of bacon, so that he may insure a more ready and profitable market for his produce. To assist his views in this respect, and in order that no barrier may be laid in the way to discourage the keeping of such a valuable animal, I shall here insert some extracts from Henderson's Treatise on Swine, &c. upon the proper method of supplying a family throughout the year with fresh pork, the pickling of pork, curing of bacon and hams for the market.

SUPPLYING FAMILIES WITH FRESH PORK THROUGHOUT THE YEAR.

To gentlemen and farmers, who have large families, may be recommended the following plan of supplying themselves with fresh meat, which is one much practised in the south of England.

Purchase a sow of the real Chinese, or thick, round, black breed; she will bring up from eighteen to twenty pigs yearly, and that sort may be made fat for pork when from four to six months old. Allow the same sow to breed so long as she proves a kind mother and good nurse; but when she turns the contrary, feed her off, and put a young one in her place. The farmer, or some of his neighbours, may have a boar of the same breed, or if he be of a larger sort, it may do for one cross; but the sow should always be of the sort described. Build a small house, such as will admit two of these pigs to feed in, and let it be as near the back kitchen as possible, for servants dislike to go a distance to give pigs any trifling offals from the table or kitchen. Let two pigs be always in the house at once, and one may be killed every three weeks, as they will be quite fat enough about six weeks after they are shut up. First, put up one to feed, and at the end of three weeks put another into the house; and always as the oldest residenter is killed, put in another pig to the one left: and so on, always keeping two in the sty at once. In this manner, a few swine are sufficient to supply plentifully a table every day at a small expense. Scotch people in general (particularly the lower class) are not fond of pork; but the cause of this dislike may arise partly from prejudice, and partly from the swine that are reared in Scotland being kept to a great age, fed to a great weight, and made into bacon, which is much stronger to the taste than proper pork; the latter is a delicious dish, either fresh or pickled. During the warm months in summer the pickling must be carried on in a cold cellar, which, if found insufficient, the slaughtering may be suspended for a little, and the family supported entirely by the cows; being then a plentiful season for their produce. The housewife may cure some of these little hams in the Westphalia form. The method of doing so is to sprinkle the ham over with salt, and let it lie for twenty-four hours; then take out any blood that may be in it, and wipe it dry. Mix a quantity of brown sugar, half a pint of bay salt, and three pints of common salt, (proportioned to what quantity of hams is to be cured,) well stirred together in an iron pan over the fire till it is moderately hot, and let the hams lie three weeks in this pickle, frequently turning them; after that hang them up to dry in a chimney where peats or turf is used as fuel.

PICKLING AND KITTING PORK.

This branch of manufacturing pork has been for some time established in the neighbourhood of Berwick. The carcass is cut into pieces, and packed in kits made for the purpose, which contain some of them one cwt., others one and a half to two cwt. Salt is dissolved in water, so as to be strong enough to swim an egg; then it is boiled, and when cold, poured into a kit upon the pork until it cover it. When the end of the kit is fixed in, the article is ready for being sent to market. In many counties this mode of preparing pork is yet unknown; but it certainly would be a great advantage were it to become more general, especially in those parts of the kingdom where much pork is made into bacon: for how common is it in such parts, near the end of the curing season, to bring young half-fed pigs to market not fit to be made into bacon, but would answer the purpose of pickling. In this case, all the old and well-fed swine might be manufactured in the former way; the inferior sort in the latter. Thin swine lose more weight in drying than well-fed ones, and do not take the market so readily, nor yet bring so good a price. It would, therefore, be advisable for both methods to be carried on together, or at least to exist in the same county, as the variety of stocks affords different kinds of pork suitable for the two ways of preparing it for market. Pigs for pickling do not require such high feeding as the other, neither would they answer the purpose if too fat. A farmer having convenience for keeping five breeding sows, may have for pork eighty pigs every year. The February litters would be ready for pickling the latter end of October, just as taken from the stubbles, without being put up to feed with meal. It may be necessary, however, one month previous to their being killed, to let them have plenty of raw potatoes thrown among them every morning and evening; and, as formerly stated, never let them go to bed empty. If this is minutely attended to, when eight or nine months old they should weigh nine stone, (if of a proper breed,*) which, sold at six shillings per stone, will amount to £216. By this plan the farmer has only forty pigs on hand at once. By the time the August litters are taken from their dams, the February ones will be nearly ready for slaughtering. The former lot will be fit to kill at the end of March, at which time the next February litters will be weaned. Five sow pigs must be kept from every February litter for breeders. The five sows will, in this case, be fed after having had two litters of pigs, and will at that age weigh twenty-four stone each, at the above rate will amount to £36; which, added to the produce of their offspring, makes £252.

The number of swine may be proportioned to the size of the farm. In my opinion this method will pay as much, if not more, than the other. It will be observed that when the pigs are arrived at the weight of nine stone they are heavy enough for the purpose of pickling, and at that period they are ready, if the farmer chooses, to be put up to feed for bacon. It will at least take three months before they can be fed to the weight of eighteen stone; and will consume one stone of meal each, besides potatoes, for every stone of pork that they increase, which is little more than one and a half pound of meal each per day: consequently, not so much clear profit will arise from the increase of the last nine stone as from the first, when taking the expense of feeding, fuel, and attendance into account There is another advantage which the pork pickler has over the bacon curer; the former can prepare his goods for the market in one week, and ship it the next; at which time he can draw upon his correspondent for the amount, while the latter lies out of his money from three to nine months, besides incurring a deal of more labour and risk. The cottagers likewise reap an advantage by the pickling system, as they are thereby enabled to keep two pigs as easily as one; and are not then obliged to sell at a reduced price, from not having a sufficiency of meal to prepare them thoroughly for bacon, as is very frequently the case. But although the above remarks may assist the proprietors of pigs in determining upon the best mode of preparing their stock for market, yet local advantages must still remain as a principal guide. It is enough to suggest that the pickling system only wants to be more generally known and practised to prove its equal share of advantages to the curing of bacon; and further, evince the propriety of both systems being inseparably connected, in order to consume the produce of a country to the best advantage.

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* For the proper breed of pigs for pickling or making into bacon, see Introductory Remarks, p. 251.

CURING BACON AND HAMS.

When a pig has hung all night after being killed, or rather when the carcass becomes quite firm and stiff, it may be taken down, and laid on a strong table upon its back; cut off the head close by the ears, and the hinder feet so far below the hough as not to disfigure the hams; leaving plenty of room to hang them by. Then take a cleaving knife, and divide the carcass up the middle of the back-bone, laying it in two equal halves. Cut the ham from the side, at the second joint of the back-bone, then dress it by paring a little off the flank or skinny part, so as to shape it with a half round point, clearing away any top fat that may appear. Next take off the sharp edge along the back-bone with the knife, and slice off the first rib next the shoulder, where will be observed a bloody vein, which must be taken out; for if left in, that part is apt to spoil. The corners must be squared off where the ham was cut out. In killing a number of swine, the sides and hams dressed the first day may be kept separate, and piled up across each other upon some flags or boards, giving each flitch and ham a powdering of saltpetre, and then covering them over with salt. The saltpetre ought not to be omitted, as it opens the pores of the flesh to receive the salt, and likewise gives the hams a pleasant flavour, and makes them more juicy. Let them lie in this state about a week, then turn those on the top undermost, giving them a fresh salting. After lying two or three weeks longer they may be hung up to dry in some chimney or smoke-house, or turned over again without the addition of more salt; in which state they may be allowed to remain for a month or two without receiving any injury, until it is found convenient to dry them. It was a custom some years ago, particularly in Dumfries-shire, to get the flitches and hams dried throughout the country in farmers' and cottars' houses; and I believe this custom still exists, although attended with numerous inconveniences, such as being frequently overdried, &c. &c. But where the curing of bacon and hams is carried on to any extent, such a practice is mostly superseded by the erection of proper smoke-houses. The following is a description of a very simple one constructed by my father upwards of thirty years ago. It was about twelve feet square, and the walls seven feet high, with six joists across, one close to each wall, the other four laid at equal distances. A piece of wood strong enough to bear the weight of one flitch of bacon was fixed across the one end of the flitch with two strings, with the neck end hanging down; the wood was a little longer than the flitch, so that each end rested upon a beam; they were placed as near each other as possible, without touching. The width of the house admitted five rows, and twenty-four flitches in a row; the same number of hams were generally hung in a similar manner above the flitches. The lower end of the flitches were about two to three feet from the floor, which was covered about six inches thick with sawdust, kindled at two different sides; it burned without any flame injurious to the bacon. The door was kept close: there was a small hole in the roof to allow part of the smoke to ascend. Bacon and hams so prepared are generally ready in about ten days to pack into a hogshead and send off to market; but they may hang a little longer if required, without losing much weight. After the bacon is salted it may lie in the salt-house, as described, until an order is received; then immediately hang it up to dry. Bacon can only be cured from the middle of September until the middle of April.

In the preceding pages I have entered as minutely into the thorough management of pigs as the limits of this volume will admit; but should the explanation be thought by my reader either to be defective, or at least not so minute as his views or scale of management might require, I must beg leave to refer him to other treatises on the subject, among which, I trust that he will find that already referred to deserving of notice.

CHAPTER V.

GENERAL REMARKS ON BREEDING AND CROSSING DIFFERENT KINDS OF STOCK.

SECTION I.

ON BREEDING.

From what has been stated in the preceding part of this treatise relative to the various kinds of live stock, the inference must be, that the greatest profit is not particularly centred in breeding, rearing, or feeding, either the small, middle sized, or large breed of animals, whether of horses, neat-cattle, sheep, or swine; but that each size will pay most in the respective situations best calculated for them, and that some kinds of equal size will answer better than others. This, I trust, experience has fully proved to most of my readers, at least it has done so to my entire satisfaction. But I shall now proceed to pass some cursory remarks applicable to breeding in general, upon the different kinds of live stock which I have already noticed, taking them in order.

HORSES.

In the breeding of horses, for whatever purpose, the males and females ought to be true-proportioned, and of the middle size of their kind;* for of this description it may be observed that the most useful, hardy, and healthy animals are to be found, whether of a Shetland pony, carriage, draught, hackney, or blood horse. The sire and dam of the intended offspring should likewise be of a healthy and strong constitution, free from all internal or external diseases, possessing life and activity; the using of their legs being apparently more a pleasure than a pain; freely lifting, throwing out, and setting down their feet: for although speed is not always necessary, it is quite indispensable for durability, that, whatever portion of it be requisite, it should be performed with ease and cheerfulness, whether of a walk, trot, canter, or gallop. The strength or bone requisite must be regulated by the intended purpose of the offspring.

NEAT-CATTLE AND SHEEP.

The same remarks are here applicable, viz. in breeding from males and females of a true proportion and middle size of their kind; for it must be observed that the largest and coarsest of whatever kind of neat-cattle or sheep take more meat in proportion to their size, feed much slower, do not make such valuable kind of beef or mutton, and produce less weight of the valuable parts in proportion to their size and appearance, than the fine-boned and well-proportioned of a middle size. They are, further, less hardy in proportion as they reach beyond the medium size, being more subject to diseases, and require more shelter and nursing in winter. It is likewise worthy of remark, that a thick hide or coarse heavy fleece generally covers a slow-feeding animal, producing coarse-grained beef or mutton; but this must be guarded against with some degree of precaution, for thick coverings of a certain description are absolutely necessary in some cold exposed situations;* for although in proportion to the fineness of the covering, the animal will be of a more kindly disposition to fatten, and likewise prove finer grained beef or mutton; yet it will be less hardy, and consequently not so well calculated for resisting the inclemency of the weather.

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* Remember the old proverb, "all extremes are wrong."

But the above remark, viz. that a thick coarse hide or heavy fleece always covers a coarse-grained slow-feeding carcass, does not hold good in a general point of view; (as is affirmed by most writers;) but is only applicable when adhering to any particular breed of either neat-cattle or sheep; for allowing a rough-coated, thick-skinned highlander to be grazed or fed along with some of the large light-covered, thin-skinned, short-horned breed, I am of opinion that the carcass covered with the thin skin would neither be so soon ready for the shambles, nor so much thought of when in it. With regard to sheep, a similar remark will hold good with a rough-coated wether, and some of the Merino or other fine-wooled breeds. Small bone is a more sure indication of a quick feeding and fine-grained carcass, especially when applied to any particular breed of neat-cattle or sheep. The combination, therefore, of a small bone with as heavy a carcass as possible, ought to be the chief aim of the breeder; for such a stock, of whatever breed, will always pay most for the quantity of food consumed from the time of being calved or lambed, until it is fat or fed off. But it not unfrequently happens that the coarsest animals pay the grazier better than the finer ones, the buying-in price of the former being (in consequence of undervaluing) much lower than that of the latter, in proportion to their state of fatness or price when thoroughly fat;* consequently must still pay the breeder worst, although at some times the fattener best.

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* The above description is a thick hide pliable to the touch; that is, being easily moved from the rib; and, as it were, loosely attached to the flesh—having a mellow handle, and closely set with fine soft hair.

The observations already made are absolutely indispensable in raising a stock of general utility,—but the whim of custom or fashion must not be entirely lost sight of; for if horns be in fashion, cattle without them will be looked down upon in the market however good, or *vice versa;* in short, the fashionable colour, length of the leg, shape and colour of the horn, thickness of the pelt or its covering, or any other supposed valuable external mark, must, in some degree, be adhered to; at least the impropriety of exceeding in such criteria must be brought to light by degrees, as the introducing of any new stock, however valuable, may ruin an individual before a long-established custom or prejudice be removed. But although we find useful and profitable neat-cattle and sheep with horns and coverings of various colours, legs and horns of different dimensions, and both with and without the latter, skins and their coverings of different qualities; yet it does not follow that such external marks are altogether unnecessary and unavailing, for I should think that experience must have clearly dictated to any minute observer, with his eyes open to conviction, that an animal of a dark colour is almost invariably the hardiest;† that in young cattle sappy-like horns widely set, and extending a little out at the points, and legs apparently too thick for the size of the carcass, are sure indications of great and speedy growth: further, that in making fat, those are the slowest, and make the worst beef or mutton, which have the thickest and coarsest covering of their kind, as has been already explained. That such are the general essential marks, when connected with the true shapes (formerly described for each species) and coupled with the sense of feeling,* for rearing or buying the most valuable kind of stock, I think few, who have had any experience, will be the least inclined to doubt.

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* The great disparity of price between lean coarse stock and fine-horned handsome-shaped ones in the same state, arises from the latter being infinitely superior, and run upon to such a degree, and frequently imagined that difference of price, however great, cannot bring them to an equality. But the cautious grazier makes his calculations more minutely, by purchasing such despised stock when under-rated and arrived at full growth for feeding; as he finds that, although they are considerably longer in getting fat, such a difference of price will in general do more than compensate for such a defect: and he further finds that, although fleshers have their favourite kinds of fat, and will pay a little more at times for one animal equally fat and heavy as another, yet that by them a truly fat beast is never despised, of whatever description, and that the commencement of their mental calculation (which is generally about the time they are handling) is, what will this animal weigh? which is the key-stone or regulator to a flesher's price.

† This, however, must be observed is only applicable to neat-cattle, which probably originates from dark hair being thicker in the pile; or being instilled in the constitution similarly to mankind, where the man with the dark swarthy skin will be found to be more robust and hardy than he with a fine white, delicate one.

SWINE.

The same observations will here hold good which have already been advanced relative to the breeding of neat-cattle or sheep; that is to say, in as far as they will admit of application to this kind of stock; and the most valuable kinds of which, that ought to be reared or fattened, are at once pointed out, according to the demand for the various ways in which they are consumed or brought to market.† But let it be remarked and remembered, that without good nurses, (for which good feeding is the key-stone,) in whatever kind of stock, all attempts to breed and rear in perfection will be found ineffectual.

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* What is here understood by feeling is to distinguish, by slight touching with the fingers the fattening points, (viz. shoulder, score, breast, twist, ribs, hips, rump, flanks, &c.) whether or not the animal is kindly disposed to fatten, and on which part it will make fattest. This is, however, a very nice point to judge of accurately without much practice, as the grand secret lies in properly discriminating a soft, pleasant, mellow feel, from a loose flabby one. The nearest distinction which I am able to draw between those loose feels, (although apparently to one inexperienced the same, yet very widely different in their results,) is that the proper fattening one resembles the pressing gently between the finger and thumb a little butter (free from the extremes of hard and soft) covered with a piece of thin linen cloth; and that the other resembles the handling of a soft down pillow or bed not full. It may be here observed that the two feelings are both soft and loose, yet the former possesses a degree of firmness which the latter does not, although equally pliable when a little hard pressed.

† See General Remarks for selecting Pigs, p. 253.

SECTION II.

ON CROSSING.

That great improvements have been, and may still be made, by judiciously coupling animals of the same species with one another, both of the same and different kinds, must be generally admitted; at the same time, it must however be observed and confessed that numerous and unprofitable attempts have been made by injudicious matching; proceeding most frequently from a wish to have all at once the desired object accomplished. For example, how common was it a few years ago, with a view of producing an offspring that might be suitable for the saddle, plough, or harness, to couple small slender mares (perhaps half or three parts blood) with strong, rough-legged, coarse, heavy work horses. But experience has proved, to the satisfaction and mortification of all who have tried such an experiment, that such offspring possesses neither the expected property of strength of the one parent, nor any degree of the life or activity of the other; in short, instead of being calculated for various purposes, as was expected, they are found to answer none. There have been likewise similar failures in attempting to improve neat-cattle and sheep, such as the bulls of the improved Lancashire or long-horned breed being coupled with Galloway cows; likewise bulls of other improved English breeds are allowed to have done much injury to the stock in various parts of Scotland where they have been introduced. Although the improved Leicester tups have, in some instances, made considerable improvements on various flocks, yet in many they have failed where the ewes with which they were coupled were too great a contrast. Such circumstances as the above would clearly dictate the impropriety of coupling together animals so widely different in their forms and constitution; although once coupling of such may sometimes have the desired effect, when followed up by always breeding for a time from the best of the offspring, coupled with animals of the original blood; of which the following are most satisfactory instances. Many of the trainers of blood horses in England will tell you that the celebrated racer Samson (which won five royal plates when six years old) sprung from a cart-horse; and the following was asserted by an old well-known trainer to be a true pedigree. "Samson was got by Blaze; Blaze by the Flying Childers; Childers by Darley's Arabian; his dam by Hip, grandam by Spark, son of Honeycomb-Punch, great grandam by Snake, great great grandam by a cart-horse that covered mares at two shillings and sixpence each, great great great grandam was Lord D'Arcy's Queen." Samson having got many good racers, among which was Bay Malton, that never was beaten, shows that he was not a chance horse, but that he had gained power by the cross of the cart-horse. It is likewise asserted as a well-known fact, "that Lord Orford improved his greyhounds by a cross with the bull-dog; but the progress was not so rapid, as he had seven crosses before he got the greyhounds to run to perfection again, and the racehorse required only three. If another cross had been repeated with the cart-horse or bull-dog, the probability is, that their progeny would be entirely spoiled for running."*

Such circumstances as these prove the advantages to be derived from crossing judiciously, and the erroneousness of always breeding from the nearest affinity, so much supported by Mr. Culley in his Treatise on Live Stock, where he gives the following statement. "The great obstacle to the improvement of domestic animals seems to have arisen from a common and prevailing idea amongst breeders—that no bull should be used in the same stock more than three years, and no tup more than two; because, (say they) if used longer, the breed will be too near akin, and the produce will be tender, diminutive, and liable to disorders: some have imbibed the prejudice so far as to think it irreligious; and if they were by chance in possession of the best breed in the island, would by no means put a male and female together that had the same sire, or were out of the same dam. But, fortunately for the public, there have been men, in different lines of breeding, whose enlarged minds were not to be bound by vulgar prejudice or long-established modes, and who have proved, by many years' experience, that such notions are without any foundation.

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* See Parkinson on Live Stock: Introduction, p. xix. and xx.

Mr. Bakewell has not had a cross (from any other breed than his own) for upwards of twenty years; his best stock has been bred by the nearest affinities; yet they have not decreased in size, neither are they less hardy, or more liable to disorders; but, on the contrary, have kept in a progressive state of improvement. This mode has also been frequently practised in breeding the best dogs and game-cocks. A certain gentleman, who produced the best pointers in the north of England for many years, never bred from any other than his own; because, he said, he could not find better to cross them with. But one of the most conclusive arguments that crossing with different stock is not necessary to secure size, hardiness, &c. is the breed of wild cattle in Chillingham Park, in the county of Northumberland. It is well known these cattle have been confined in this park for several hundred years, without any intermixture; and are, perhaps, the purest breed of cattle of any in the kingdom. From their situation and uncontrolled state, they must indisputably have bred from the nearest affinities in every possible degree; yet we find these cattle exceedingly hardy, healthy, and well formed, and their size, as well as colour, and many other particulars and peculiarities, the same as they were 500 years since. From these instances it appears there can be no danger in breeding by the nearest affinities, provided they are possessed in a superior degree of the qualities we wish to acquire; but if not possessed of these, then we ought to procure such of the same kind as have, in the most eminent degree, the valuable properties we think our own deficient in. It is certainly from the best males and females that best breeds can be obtained or preserved; to breed in this manner is undoubtedly right, so long as better males can be met with not only amongst our neighbours, but also amongst the most improved breeds in any part of the island, or from any part of the world, provided the expense does not exceed the proposed advantage. And when you can no longer, at home or abroad, find better males than your own, then, by all means, breed from them, whether horses, neat-cattle, sheep, &c.; for the same rule holds good through every species of domestic animals; but, upon no account attempt to breed or cross from worse than your own; for that would be acting in contradiction to common sense, experience, and that well-established rule, 'that best only can beget best;' or which is a particular case of a more general rule, viz. that 'like begets like.'"

There seems a degree of plausibility and sound reasoning throughout several of Mr. Culley's arguments in favour of breeding 'in and in;' but experience has now fully proved that such is not by any means practicable, at least to the extent he seems to suggest; on this head I am so much convinced that the public are so fully satisfied, that I conceive it unnecessary saying any thing more on the subject. But notwithstanding that I approve so highly of Mr. Culley's treatise in general, and by many of his valuable hints I have been much benefited, yet I cannot here overlook his remarks on the subject of crossing, some of them being so widely different from what experience has dictated to me. With respect to the first argument used by Mr. Culley in favour of breeding from the nearest affinities, I cannot pretend to contradict, in as far as Mr. Bakewell was successful in always breeding from his own stock; but this I can assert as a fact, that my father was a strenuous advocate for Mr. Bakewell's favourite sheep, and was at considerable expense in establishing such a stock upon a large scale: he continued having tups yearly for some time from Mr. Culley, or some of his brethren in trade, possessing such good qualities, in which he conceived his own to be deficient: this was persevered in until his own tups seemed equal to those he was in the habit of hiring; he then contented himself with breeding from his own, being satisfied that they possessed all the necessary requisites: but in the course of about eight or nine years his stock began to degenerate by the carcass and fleece falling off much in weight, particularly the latter, the staple of which, particularly on the backs of the sheep, became similar to that of a lamb one month old, and their bellies became entire- are. Being at a show of tups at Malton, Yorkshire, I purchased a tup at an extravagant price; he seemed to be a cross between the Leicester and Yorkshire breed; he was by no means fine, but had a degree of roughness about him, viz. of mutton and wool, which my father's stock then wanted; on the arrival of the tup he did not exactly relish his appearance, but very soon became reconciled to him after seeing his offspring. One cross put the stock as it were to rights, and then the system of breeding from his own stock commenced again. At my father's decease I became tenant of his farm, and proprietor of the stock, &c.; but in the course of five or six years the stock began to fall off as above. I then purchased a true Tees-water tup, which was much rougher than the former one; indeed he had no claims to beauty, except the weight of fleece and carcass. This cross, however, succeeded well, and soon put me in possession of a stock which gave the highest satisfaction in every respect.* I have repeatedly observed other flocks of sheep fall off in a similar manner to that already described, which I am convinced proceeded from the same cause, owing to the proprietors being too strong advocates for Mr. Bakewell's system, to adulterate or pollute their fine breeds with either the Tees-water or Yorkshire blood: however, had they benefited as much by the pollution as I did, they would soon have become converts. It may be observed that my father's stock did not begin visibly to degenerate until the expiration of eight or nine years, neither did mine until the end of the fifth or sixth year,† which may be accounted for in the following manner. The system pursued was always to keep entire about six male lambs (more or less as the number of ewes kept might require) from the best ewes, (as directed in note p. 182,) sometimes by the same sire, while at other times by different ones; out of these six tups, three of the smallest and finest bred ones, with less wool, were coupled with the strongest and coarsest of the ewes with heavy fleeces; while the three strongest and coarsest of the tups with heavy fleeces were coupled with the smallest and best bred ewes of least wool, mothers excepted. This degree of crossing* kept the stock in a progressive state of improvement for a much longer time than if only one or more tups of a similar quality had been kept;† for the fewer the number of tups kept, they must of necessity be sooner coupled with their own offspring; for instance, allow a tup to be put to ewes when two years old—five months thereafter his offspring appears—which, when two years old, will be fit for propagation; consequently, it must either be commenced with their own sire, or their brother by the sire's side, whence the sire's blood is coming in close contact in the fourth year; whereas, when two tups or kinds of tups are kept, it would, according to the system pointed out, be eight years before the sire's own blood came in contact;‡ hence, it may be observed that people may breed from their own stock for a great number of years, and not be breeding from the nearest affinity. If, therefore, my father preserved his stock from this for eight or nine years, and kept them in a progressive state of improvement, with six tups, why might not Mr. Bakewell do the same for twenty years by having double or treble that number of tups?

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* See note p. 168.

† The reason why my stock began to fall off sooner than my father's was owing to the perfect state in which it was, and was therefore thought unnecessary to keep two sets of tups, managed in the manner already described; consequently breeding from nearer affinities sooner commenced.

The next supports which Mr. Culley brings forth are those of the pointer and game-cock; in neither of which stock I have had much experience, although foolish enough to have had both in my possession at times in my younger days. I have, however, had occasion to observe coincidences relative to both, quite contrary to the opinion which Mr. Culley seems to have held respecting them. For having been repeatedly in the field with gentlemen, who, according to the common phrase, "had the best breed of dogs in England;" and, on observing some great faults by their superior looking animals, particularly in running over game; and upon inquiring at the gentlemen the cause of such blunders, while some more inferior looking dogs at the same time were committing no such mistakes; the answer to my repeated inquiries (of different sportsmen) was invariably that their dogs were getting too near bred, which they afterwards rectified by a cross from something of a rougher stamp. A very convincing circumstance of the impropriety of breeding pointers too fine, came under my particular notice some years ago. A brother of mine (a great sportsman) was shooting in Dumfries-shire with a friend of his from England, who brought with him some high-bred elegant looking pointers; one of the best, to appearance, was continually hunting over game without finding, which so much enraged the gentleman that he took up his gun to shoot her; but my brother's petition was heard in saving her life, and she was instantly made a present of to him. He kept her for many years: she never was very good herself, neither was the first litter bred from her by a high-bred dog; but she produced afterwards some of the best pointers in the county, by crossing with dogs with about one third of the rough pointer in them.

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* In pursuing the above system of crossing, the ewes should be marked the same as the tups with which they are coupled, as likewise the offspring of the tups.

† As a further proof of the above, it may be observed, among the ordinary breeding stocks of horses or neat-cattle when allowed to couple themselves, that where the fewest males are kept the stock sooner begins to degenerate.

‡ Own blood is mentioned, because allowing that the two tups at commencement were brothers by the sire's side, the same blood would consequently come in contact the fourth year; but from the one tup being much finer than the other, it would appear that they have partaken of different natures either from the dam or forefathers, consequently will prove more a cross than if both had partaken of the same nature.

As to the game-cocks, I have accidentally been in some of the cockpits in England, sometimes from curiosity and at other times from being in *good* company, and have frequently seen fine looking cocks refuse to meet their antagonist; likewise some of them ran away after tasting very slightly of the steel or silver; which circumstances were always accounted for by their being too near bred; indeed, so much was their breeders convinced of this, that they frequently preserved them for breeding, saying, that a single cross would make their offspring "face, and stand and handle the steel." I must, however, agree with Mr. Culley as to the wild cattle being the most conclusive argument which he has set forth, (although to me not by any means satisfactory,) in endeavouring to show that crossing with different kinds of domesticated animals is not necessary to secure size, hardiness, &c. Similar remarks might be made of deers in the enclosed parks, or rabbits in a warren. But these are undomesticated animals allowed to remain in their original state, which I shall endeavour to show do not receive such a perceptible injury (if any) from breeding from the nearest affinity as those domesticated improved ones do. For example, I shall take all the kinds of live stock on which I have been treating, that some years ago inhabited many of the remote parts of the Highlands and Western and Northern Isles, where, until of late years, they were equally uncontrolled,* and had similar opportunities of breeding from the nearest affinity to the wild cattle in Chillingham Park. Such stocks were small and rather well proportioned, hardy, and had been so since the memory of the present and preceding generations, without having undergone the least change whatever; indeed, if they had fallen off even one twentieth part of what I am convinced the improved stocks do when allowed to breed too near, they would long ere now have been quite invisible. In those days, breeders found no expedient necessary in keeping their stock at the same degree of perfection, (as they then imagined it) but it is now quite otherwise; for in parts where improvements have been made, occasional crossing is found to be indispensably necessary, in order to keep stock even at the improved state to which it is brought; as a convincing proof of which, the following are striking instances. In the island of Islay, where I have had frequent occasion to visit in course of my business, formerly the breed of horses was exactly of the stamp already alluded to, but the late principal proprietor of that island made great improvements by crossing,† and being allowed to breed again from the nearest affinity, they are now quite degenerate, and even worse than they were in the original state. I have likewise witnessed similar instances with respect to the neat-cattle in that island. The above proprietor some years ago, from his attention to proper crossing, for many years produced the best stock in the market;* and the other breeders in that island likewise produced very superior stock, but whether from a falling off of spirit in those breeders or from becoming '*Bakewellites*,' they ceased introducing strange bulls for many years; in consequence of which, I observed when in Islay a great inferiority of their stocks compared with those which I had formerly seen them show at Dumbarton markets. But I am happy to observe a superior cast appearing in their young rising stock, occasioned by an enlivening of their former spirit, in making judicious crosses with strange bulls. Such circumstances as have been now quoted, I trust, do not only show the advantages to be derived from occasionally crossing, but that it is more necessary to keep up an improved stock than one in its original state undomesticated or bordering upon it.† But although I have been writing in opposition to Mr. Culley's remarks so far on this subject, yet I agree with him to a certain extent in the inferences which he draws from his arguments, viz. in continuing to breed from your own stock as long as it possesses a *superior degree* of the requisite qualities. But in support of the doctrine which I have been holding out, an occasional cross from your neighbour ought to be preferred, provided his is equal to yours, or should it even possess a superiority over yours in any one point, in which it may be most defective; although far deficient in other respects, and not so good when taken collectively, even then a single cross should be preferred. But

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* Indeed they remain so still in some parts of the Highlands, particularly the horses and pigs, which are very small and as wild as hares.

† See note, page 7.

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* It was not uncommon some years ago for Mr. Campbell of Shawfield and the Duke of Argyle, (who paid similar attention to crossing his stock) to receive double the price for cattle of the same age from other parts of the Highlands. I have frequently seen the cattle of those spirited breeders, when three years old, sell for £18 to £24 per head at the Dumbarton market.

† Among stocks of the above description, a greater number of males are running at large coupling with females at pleasure, consequently the doctrine held forth from page 282 to 285 may be here applied, and the chance of hurting the stock in one year from breeding from too near a kin, may be rectified in another by coupling more distant connections. But what I attribute more generally to be the real cause, is that the nearer perfection the more difficult it is to support that state; and any falling off from such a state is more perceptible and acutely felt.

Mr. Culley, further, very properly states, "that if your own stock is not possessed of all the requisite qualities, you ought to procure such of the same kind having the valuable properties in the most eminent degree in which you think your own most deficient." But if this defect cannot be made up from stock of the same kind, should recourse not then be had to others, in order to secure the desired quality? for is it not possible to have a stock deficient in some particular point, and even superior in that very point to any of the same breed which can be found? I should suppose this to have been the case with Lords D'Arcy and Orford when in search of strength, otherwise they certainly would not have had recourse, the one to a cross with the cart-horse to add strength to the blood, and the other to the bull-dog to improve the strength of the greyhound.* To conclude; it may be observed from what I have stated, that stock may be much improved both by crossing with strangers, (of the same or other kinds of breed) and in some instances breeding from your own to a certain extent. The whole mystery, therefore, seems to rest in judicious coupling, by knowing how deep to make the cross, and how long to continue breeding from your own. To breed and cross to advantage, therefore, evidently requires system, method, and judgment. The observations necessary in judicious coupling are, to guard against too great an inequality of size,† shape, quality, or constitution,‡ and not to attempt all at once to make up deficiencies, but convert what is wanted in a progressive indirect way. For instance, if you wish to give your cart-horse a 'dash of blood,' couple the mare with a half bred coaching horse or hunter, and if necessary put mares of their offspring to the same description of stallions, and so on until the degree wished for be obtained; and in like manner convert blood, size, strength or action; in short, supply all requisites or defects by regular gradation, whether horses, neat-cattle, sheep, or swine, the same rule being applicable to all the different species of domestic animals, as you will come much sooner to your purpose in this way than by overdoing, and having again to breed back as the Lords already mentioned were, very probably, obliged to do, when wishing to add strength to their blood horses and greyhounds, from not being able to find stronger animals of the same species to couple with. Minute attention to the particulars now given relative to crossing, followed up by the treatment most suitable to the nature of the offspring, will fully recompense any breeder for his trouble, provided the whim of fashion does not lead him to an irrecoverable degree of extravagance in selecting his males or females. But allowing that all the remarks stated in the preceding pages are necessary and useful in the proper selection and management of the various kinds of live stock taken notice of, this cannot be accomplished to any degree of perfection or profit, without an equal supply of judgment attentively acted upon, relative to the kind of farm which each kind of stock, with its respective system in which it is managed, ought to possess; which naturally leads next to introduce the chapter on the management of grazing farms, from the inseparable connexion which it has with the thorough management of live stock.

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* The disadvantage attending such crossing, consists in the time and expense before the offspring could be brought to run again, whereas if blood horses and greyhounds of superior strength could have been procured, however slow, their progeny would evidently have come much sooner to running.

† The impropriety of which, particularly in sheep, may be seen from the great number of deaths occasioned by coupling large tups with small ewes.

‡ Many crosses misgive, from the sire's constitution being so much more delicate than the dam's, and the accustomed treatment given to the latter being continued to the offspring, which ought to partake of as great a proportion of the sire's requisite treatment as they seem to possess of his constitution.

CHAPTER VI.

MANAGEMENT OF GRAZING FARMS.

SECTION I.

GRAZING CONNECTED WITH TILLAGE.

BEFORE proceeding to describe the proper management of such farms, it would not have been foreign to the subject, or altogether unnecessary, first, to have stated or pointed out such lands as ought to be constantly under grass, and such as ought occasionally to be so; seeing that some descriptions of land and situations are more adapted for corn than grass, and others more suitable for grass than corn, whilst some are answerable to both. But the limits of this work will not admit of a full detail on this head: it must therefore suffice for the present to remark, that land capable of culture, situated in a good climate, or of a dry nature, is in general best calculated for tillage; and that in a worse or late climate, or of a wet moist nature, is most suitable for grass; while the land possessing a medium climate and degree of moisture will answer both. These general observations, connected with local advantages, will be found invariably the best guides when judiciously and minutely attended to. But notwithstanding that the grazing farms here more particularly alluded to are such as consist chiefly of permanent pasture land, in districts entirely adapted to grazing, yet even in such farms it is not only sometimes necessary to keep a certain portion of it under a course of tillage, when it can possibly be accomplished, to produce meal, &c. for the family, and winter provender for the cattle; but it is also necessary that some parts of such farms should not remain too long in grass, but occasionally undergo a course of tillage in order to make the most of them even by grazing. It is certainly then worthy the attention of the grazier to discover the kinds of grass best calculated for his soil and climate, both as to production and durability. It is too prevailing an error to follow the common rule of sowing down land with ryegrass and clover, without paying any respect to soil or climate. Experience has no doubt fully established that such a system is best calculated for that description of land where two or three crops of grass at most ought only to be taken, and then put under a course of tillage again.* But for permanent pastures or such soils as would produce some kinds of healthy, good feeding plants in luxuriance, while they would only give a scanty supply from the above-mentioned seeds, and in many cases produce nothing from them at all, it requires only a very small portion of common sense to point out the propriety of deviating from such a general rule; for would it not be unprofitable and conceived to be a want of judgment to sow wheat upon light sandy soils where barley is found to be most profitable, or to sow barley upon deep clay land where wheat is found to answer best? Seeing, therefore, that such soils answer and pay best when certain kinds of grain are sown upon them, is it not probable that a similar effect will be produced by an application of the most suitable grass seeds? for be assured that each kind of soil and climate has favourite grasses as well as grain, which experience will soon point out. In situations where any kind of valuable grass grows spontaneously, such ought there to predominate in the preparing of land for permanent pasture: but, in order to afford every assistance on this head, the following table contains the proper kind and quantity per English acre for various soils, as recommended by eminent practical cultivators.

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* The quantity of ryegrass and clover seed used per acre, varies very materially throughout the kingdom. Upon heavy clay soils where one crop of hay is only intended to be taken, one Winchester bushel of annual grass seeds and from twelve to sixteen pounds of red clover are generally sown upon a Scotch acre; but when one or more years of pasture are intended after hay, one bushel of perennial ryegrass, from eight to twelve pounds of white clover, and yellow clover and rib grass of each from two to three pounds, are sown upon an acre. The quantities per acre vary, however, owing to the wetness or dryness of the soil; for when land is of the former description, a larger quantity of seed is necessary.

TABLE.

CLAY.		LOAM.[*]		SAND.		CHALK.		PEAT.	
Seeds per acre.	*Substitutes per acre.*	*Seeds per acre.*	*Substitutes per acre.*	*Seeds per acre.*	*Substitutes per acre.*	*Seeds per acre.*	*Substitutes per acre.*	*Seeds per acre.*	*Substitutes per acre.*
Cowgrass 5 lbs.	Yorkshire White 2 bushels.	White Clover 5 lbs.	Ryegrass 1 peck.	White Clover 7 lbs.		Burnet 10 lbs.		White Clover 10 lbs.	
Trefoil 5 lbs.	Timothy 4 lbs.	Dog's-tail 10 lbs.	Ribgrass 4 lbs.	Trefoil 5 lbs.		Trefoil 5 lbs.		Dog's-tail 10 lbs.	Yorkshire White 6 pecks.
Dog's-tail 10 lbs.	Timothy 4 lbs. or Yorkshire White 1 bush.[†]	Ryegrass 1 peck.		Burnet 6 lbs.		White Clover 5 lbs.		Ryegrass 1 peck.	
Fescue } 1 bush.		Fescue 3 pecks.	Yorkshire White 2 pecks.	Ryegrass 1 peck.	Ryegrass 1 peck.	Yarrow 1 bush.	Ryegrass 1 bush.	Fox-tail 2 pecks.	Ribgrass 5 lbs.
Fox-tail }		Fox-tail 3 do.	Timothy 4 lbs.	Yarrow 1 bush.	Ribgrass 4 lbs.			Fescue 2 do.	Cowgrass 4 lbs.
		Yarrow 2 do.	Cowgrass 5 lbs.					Timothy 1 peck.	
		OR		OR		OR			
		Marl, or Cowgrass 10 lbs.		White Clover 5 lbs.		Grass seeds from an old pasture 4 bushels.			
		White, or Dutch Clover 3 lbs.		Trefoil 5 lbs.		Ribgrass 8 lbs.			
		Trefoil, or Hop Clover 1 lb.		Ryegrass 1 bushel.		White Clover 4 lbs.			
		Ryegrass 1 bushel.[‡]		Grass seeds 1 bushel.[§]		Cowgrass 4 lbs.			
						Yellow Trefoil 4 lbs.[‖]			

[*] Let it be remembered that loam soil includes every description except stiff clay, sand or gravel, chalk or peat.

[†] Rev. A. Young in "Communications to the Board of Agriculture," vol. iii. p. 150, 151.

[‡] Mr. Davis in "Communications," vol. iii. p. 90.

[§] Mr. Greenall in "Communications," p. 283.

[‖] The above is recommended by Mr. Boys of Belshanger, in Kent. See Complete Grazier, p. 384.

The kinds of seeds specified in the preceding table, and the common rule taken notice of, have been found to answer the wishes and expectations of all who have applied them judiciously to their respective soils and situations, and paid due regard to the degree of moisture which the land naturally contains;[*] for upon a wet damp soil a greater quantity of seed is requisite than upon a dry fertile one. But in order to expect or insure good crops of hay or pasturage,[†] the proper selection of seeds is no more necessary than sowing them in due season upon land thoroughly prepared for their reception; in which there are various modes of proceeding: however, it must be admitted that the most successful is by sowing early in the spring[‡] with wheat or barley after potatoes or turnips, properly cleaned and manured; but upon thin poor land, merely intended to be laid down as permanent pasture, it will be found most preferable to sow grass seeds without any kind of grain; and should this be done after summer fallow, the land ought to be made very fine with repeated ploughing, harrowing, and rolling, if found necessary. Such treatment should likewise be extended to potato or turnip ground, should it be of a stiff nature, as it must be kept in view that land cannot be made too fine for the reception of small seeds, although such may prove injurious to the other seeds with which they are frequently sown.[§] The manner of covering in grass seeds is likewise a matter of some consequence; for in many cases they are sown upon wheat so far advanced as not to admit of either harrowing or rolling, while, in others, they receive too much of both: such treatments are equally injurious. In the former the seed is scorched by the sun, and liable to great destruction before vegetation commences, which even does not extend to a great proportion of the seed, particularly in very dry seasons; whilst, in the latter, the seed is so deeply buried as to prevent the beneficial effects of the sun from operating so powerfully as to cause such seeds to vegetate, and plants to push their way through an overload of earth: consequently, it must be most advisable to cover such seeds slightly as near the surface as possible, with the following precaution, viz. that if the land is of a stiff binding nature, the grass seeds must be covered in with a single streak of a light harrow after it has been well rolled and harrowed, to reduce it to a fine mould; but if the land is of a loose nature, the seeds must be rolled in, it being previously well harrowed. The former plan admits that necessary moisture, which, by finishing with a roller, might be excluded; and the latter retains it and excludes the drought by using the roller last.

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[*] Mr. Tollet, conceiving the degrees of moisture or dryness, rather than the component materials of the land, to be the leading character in determining the choice of seeds for future pasture, has consequently apportioned the seed for every possible variety of soils.—See "Communications to the Board of Agriculture," vol. iii. p. 439.

[†] An unfavourable season may prevent the most attentive and scientific labours from always insuring success; but such labours are a pleasant reflection, and cheering amidst the most unfavourable results.

[‡] Early sowing has many advantages; it allows the tender plants to arrive at such a length as to resist the severities of winter; likewise the grain with which small seeds are generally sown is not so apt to run to straw and lodge, (so as completely to prevent the growth of them) when sown early as late. But in very early situations it may be advisable not to sow so soon, in order to prevent the grass from coming too much in contact with the sickle.

[§] Barley, being less injured than any other kind of grain from land being made loose and fine, is thereby preferable to sow along with grass seeds.

SECTION II.

LANDS MOST SUITABLE TO NEAT-CATTLE AND SHEEP.

The management of grazing farms may be discussed under the four following heads, viz. breeding, rearing, fattening, and dairy. The key-stone to the proper management of the whole is, making land yield the greatest supply of healthy summer and winter provision; which can only be completely accomplished by a strict observance of the remarks contained in the last section, connected with a thorough knowledge of draining, irrigating, and the various modes of improving pastures, making and preserving hay, &c.; all of which will be taken notice of in their respective chapters and sections contained in the following pages. Having, therefore, a farm under such management as above described, or at least being prepared to do so, as circumstances may admit, the grazier's first consideration ought to be, what kind of stock, from the situation and quality of his farm, it is best calculated to keep; and his next is, what system ought to be adopted, in order to make the most of it. To the first of these considerations it may be replied, that, if a farm is highly situated, covered principally with heath, moss, or short grass, and without such a quantity of land as could be made to yield profitably a suitable proportion of winter food to the quantity of stock kept in summer, a sheep stock ought decidedly to have the preference, even allowing the markets not to be so suitable;* for if hunger and starvation to a certain degree are to accompany the stock kept upon such a farm during winter, it must be remembered that sheep are better calculated to endure such treatment than the hardiest of neat-cattle; and are likewise not only better endurers of hunger,† but better providers against it when both are left to their own shifts: besides, from the dependence and recourse which sheep have on heath, ling, moss, and other such vegetating winter plants, with the assistance of some summer preserved pasture, they will thrive and do well when neat-cattle could not subsist at all. Their favourite herbage may have either lost its vegetation and nourishing qualities, or such parts as may have retained them to a certain degree, by having been preserved during summer for their winter support, may be covered with snow; which sheep will, in ordinary winters, remove most readily with their feet. We may likewise advert to the injury done by supplying neat-cattle with winter provender in various places, but more particularly in the Highlands of Scotland, by ploughing up all the best spots of green pasture land, for raising a scanty supply of perhaps half-decayed straw and unhealthy corn, proceeding either from a want of knowledge or spirit of exertion in cultivating meadow ground; for which purpose, many desirable spots, and even considerable tracts of land may be seen, where nature has laid down the materials, and art has not descried the means or advantage of using them.[*] Such tillage as above mentioned only destroys the best of the pasturage, merely to keep in the life of animals during winter, which the worst supports during summer ;[†] whereas, if a sheep stock were kept upon such situations, (even by indolent farmers) the best pasture might be allowed to remain,[‡] which would consequently support more stock, when taking into account the additional quantity of sheep which might then be kept in proportion to the number of neat-cattle formerly kept. But stocking with sheep is further commendable in farms abounding with pasturage inaccessible to neat-cattle, such as steep precipices, or among rocks, &c. where neat-cattle would not attempt to go in search of food, and where sheep frequent and receive the sweetest and most nourishing particles of their food. Further, all poor thin soils, producing a short and scanty supply of herbage, and even those of a superior quality, producing grass of a short description, are both best calculated for being grazed with sheep; by which the former would, in a few years, be considerably improved in quality and closeness of sward, but which would remain in its natural state if stocked with neat-cattle.[§] The grazing of such situations with sheep, in preference to neat-cattle, requires only a short trial to be convincing of the beneficial effects. It is not, however, here intended to bias the reader by plausible reasoning, as "one story is generally good until another is told;" but for such farmers as, from their situation, might feel themselves authorized to give some ear to what has been stated in favour of keeping sheep in preference to neat-cattle in the situations alluded to, it might be as well for them, previous to trying the experiment, to hear what some unprejudiced person has to say on the subject, who has already tried it. The writer, however, is happy to observe that, of late years, neat-cattle have, in various parts, been made to give way to sheep in similar situations to those now recommended; and which it was never designed by nature that they should occupy. But it has been long a matter of dispute whether sheep or neat-cattle are the most profitable stock to be kept upon some land, where even the latter reaped every possible advantage, from being always both well summered and wintered; many authenticated statements of which might here have been given, which would almost invariably tend to show the equality of the sheep, if not, in many instances, their superiority to neat-cattle. Now, if any thing like an equality be admitted where neat-cattle are kept in good condition through winter, what must be the result in situations where they are half-starved? But there seems to be an insurmountable barrier against keeping a sheep stock held out by many of the Highland graziers, (with whom I have had much conversation and many arguments on the subject,) viz. that sheep are too far from a proper market, and are not so easily sent to it as neat-cattle. This rule may hold good among those farmers whose lots of neat-cattle are too small for sending any distance to market, and who can fre-

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* A grazing farm, to be fully stocked with neat-cattle, ought to have one fifth of it at least suitable for tillage and raising meadow hay.

† Numerous instances have been known of sheep having been covered for several weeks with snow, and still survive. Pray, what would be the result of a cow or stot being even kept in a warm byre as long without food?

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[*] The materials above alluded to are more particularly for draining and irrigating, although valuable composts (and even lime in some situations) are not unfrequently to be had upon a very slight exertion, and at a moderate expense.

[†] How common is it for farmers so situated to content themselves by having a sufficiency of good summer food, which they say will soon bring their stock round again, provided they can only keep in the life through winter until the arrival of the grass: but such people are losing sight of "a stock well wintered being half summered," and are consequently not at all aware of the loss which they sustain by such treatment.

[‡] It may be stated that such tillage is likewise necessary in supporting the family with meal, &c.; but rather than infringe so much upon good pasture land, which, from climate, is by no means calculated for tillage, would it not be more profitable to purchase such necessary provision from some situation better adapted for raising grain, even at an extravagant price? for the number of extra people necessary to be kept for cultivating such ground in some parts, generally eat up a great proportion of the meal raised by them, particularly if the spade is obliged to be had recourse to.

[§] Mr. Young states in "Annals of Agriculture," vol. xxvii. that it is the opinion of many eminent farmers that nothing recruits poor soils so much as

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heartily feeding them with sheep for some years, provided the sheep are not folded from the land; and that he has practised upon this principle with success. The land and sward are improved when fully stocked with sheep, as they prevent the rising of seed stems, which would exhaust the soil, and by their close feeding make the grass plants spread at the root, and form a thick sward of fine delicate feeding. Overstocking must, however, be guarded against, otherwise the sheep will be compelled to eat so close as to destroy the roots.

quently dispose of them to a better advantage to some of their neighbours or dealers at home. But if sheep were more generally kept in such places, would not dealers likewise come forward to relieve small tenants of them as well as neat-cattle? or, might not the larger tenants purchase their sheep from them for a similar cause to what they now do their stirks and two year- olds,[*] it being well known that the hopes of relief for those who keep extensive stocks are generally centred in the Dumbarton[†] and Falkirk markets? Now the question comes to be simply this; whether will sheep or neat-cattle to the same amount cost most in sending to these markets? I am convinced, from my own experience of purchasing both kinds of stock at the above markets, and taking them to some of the English ones, that sheep, although they will not travel so far in a day as neat-cattle, yet will stand their journey as well, if not better, and at the end cost from one half to one third less expense. Those who are not convinced of this from experience, may soon be so by a minute inquiry at any dealer who has been in the habit of driving both kinds of stock to markets at a distance. Much more might be said in favour of sheep stocks inhabiting such situations as referred to; but finding that they are gradually gaining possession of their own ground,[‡] it being already accomplished in some parts, I must here leave enterprise and experience to do so in others, which I trust time will soon accomplish. Should I have been successful in convincing my reader (if he required it) of the profit arising from a sheep stock in a direct way upon waste uncultivated lands, when compared with neat-cattle, I trust that I shall be equally so in showing the superior advantages and profit arising from them in an indirect manner upon lands under a course of tillage. But in order to complete more fully the remark relative to the grazier's first consideration, as stated in the beginning of this chapter, it might be expected that the land best calculated for keeping neat-cattle should be pointed out: this I conceive to be in part already done, by showing such as is not suitable for them. But as there are some situations where they can be kept to advantage, and others where they can still be more so, I shall briefly mention those best appropriated for them, viz. all farms possessing shelter from the severities of climate, producing a full bite of green herbage of a good quality,* connected with as much land under tillage as to furnish the necessary quantity of stock to be kept throughout winter with a sufficient supply of suitable food during that season, such as turnips and straw, or good meadow hay. Having now, I trust, made some suitable remarks to the farmer's first consideration, I shall next proceed to do so to his second one, viz. the most profitable system to be adopted.

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[*] It is a common practice in some parts of the Highlands for the small tenants to sell their stock at the above ages to some of the more extensive graziers who do not send their stock to market until three years old, and whose farms being better calculated for rearing than keeping a full breeding stock, have therefore recourse to the above method for fully stocking their land.

[†] Any one who has been in the habit of frequenting the West Highlands about the time of sending cattle off to the above market, will soon discover where the grazier's hopes or fears are to be decided, by paying attention to the prevailing toast, which even displaces the king, after dinner, viz. "A good Dumbarton market;" which must always be accompanied with '*squab as e;*' in English "take it off."

In a general rule of giving toasts, a repetition of the same does not make the bowl go well off; but I have oftener than once seen some large ones finished towards the close of a party with "a good Dumbarton;" and although I never felt any bad effects from attending the above market, yet I have frequently done so by drinking success to it.

[‡] What is meant by the sheep's own ground must not be understood to be that best calculated for them, as it has only been endeavoured to show that they are best calculated for it.

SECTION III.

THE MOST PROFITABLE SYSTEM TO BE ADOPTED UPON A GRAZING FARM.

From what has been now stated respecting the kind of stock most answerable to the different herbage and situations in a general point of view, and formerly in page 93 to 101, relative to making a proper choice of the suitable species of each stock for the different kinds of pasture situated in various climates; it is to be hoped that the grazier has now nothing to do, in order to convince the public, as well as himself, that he is pursuing a judicious and profitable style of management, but condescend upon a proper system, followed up with good rules laid down, and minutely executed and adhered to. In order, therefore, to assist the grazier to determine upon the most proper system, I trust that nothing now remains but to point out the kind of herbage and situation best calculated for the breeding, rearing, and fattening of neat-cattle and sheep, as likewise that best adapted for a dairy stock: these, with the necessary general rules of management annexed,* may, I trust, tend to remove the difficulty of a grazier's distributing to himself and his farm that justice unto which they may be individually entitled. Land most suitable (in such farms or situations as have been already noticed) for breeding, whether of neat-cattle or sheep, is such as is well sheltered from the severity of the weather, and dry, being of easy access, and little travel requisite in search of food, which ought to be of a sweet nature and of easy digestion;† and such land as is more exposed, not so dry, more elevated, and covered with herbage of a coarser nature, should be allotted to young stock more advanced in age; and this done in a regular manner, always giving the oldest the coarsest grass and most exposed situations. Hence, it is sometimes necessary to have more farms than one to complete more fully the breeding and rearing system. Such lands as are warm and well sheltered, and covered with fine, old, rich pastures, are best calculated for fattening; if neat-cattle, such as will afford an early full bite;‡ but if sheep, that of a short sweet quality will answer best.* It must be observed that what is here more particularly alluded to, is situations where tillage has no claim upon the farmer. But as there are situations where breeding, rearing, and fattening of stock can very properly go 'hand in hand' with the plough, and in which there may be very little variation of soil, pasturage, or climate; in such situations the oldest pastures should be applied to fattening,† while the new-laid down ones will answer either the breeding or rearing system. Should it, however, be more advisable to connect the dairy with the plough in such places, if making of butter be the dependence, the former pasture will answer best; but if cheese, the latter. But although it is requisite that tillage should, in most situations, be connected with the dairy, in order to provide a suitable supply of winter and spring food; yet there are many equally well calculated for it where tillage to any extent would prove injurious to the system, and indeed where it is not necessary, from abundance of fine natural meadow hay being at command, which is infinitely superior for such a stock to any kind of winter provision that has yet been raised by the plough; as it may be observed that, when cows are fed during winter and spring with hay of the above description, turnips or other succulent food are less necessary, although they will still prove of advantage. From these few hints, and a strict adherence to what will best suit the market, it is to be hoped that the young or inexperienced farmer is now fully prepared to stock his farm, and condescend upon the system most proper to pursue; which now leads to the suggestion of some general remarks necessary to constitute good management of any system or kind of stock whatever.

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* A full bite is necessary, from the manner in which neat-cattle take in their food by the assistance of the tongue.

Grass of a fine quality is absolutely necessary for a fattening or dairy stock; yet some of a strong and coarse nature is by no means despicable for a rearing one.

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* The more minute rules have been already discussed when treating of the management of neat-cattle and sheep individually.

† It is perfectly understood among sheep breeders that the best hogs are bred upon dry and well-sheltered land possessing a quantity of heath, with a good proportion of old green pasture.

‡ The advantage of 'a full bite' for neat cattle has already been pointed out; and when early in the spring it will be found to feed quicker; besides, early grass beef or mutton generally sells high.

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* Sheep are partial to short sweet pastures; consequently, when they are put amongst long grass, a great proportion of it is wasted by their travelling up and down in search of their favourite repast: this likewise retards their progress in fattening. It may further be remarked, that a heathy pasture, with a proportion of old, short, sweet lay ground, produces highland wether mutton which would grace the table of a king.

† The above rule will not always hold good, for upon land that is subject to 'fogging' the new-laid down pastures will fatten best; indeed various other causes make them in some situations likewise preferable.

SECTION IV.

GENERAL REMARKS APPLICABLE TO ANY SYSTEM OF GRAZING.

Before proceeding to make some necessary remarks suitable for each system distinctively, it may not first be improper to make some relative to the proper selection and quantity of stock and method of grazing, which are equally applicable to all systems. First, in selecting stock, of whatever kind, let them rather be from a worse than a better pasture and climate than those intended for them;* for it is a just maxim that a farmer's stock should rather be below the quality of his pasture than above it. It is likewise found advisable not to select stock from parts where they have received water in its utmost purity, and place them in situations where that fluid is not so wholesome. To attempt giving any thing like a just statement as to the quantity of stock which farms of a certain extent in various situations will keep, would not only be endless, but the attempting of it might prove more injurious than useful to the young or inexperienced farmer. For example, on some of the most fertile pastures in Lincolnshire two acres will summer an ox and fourteen sheep of the large breed, while some of the more inferior pastures in England will only keep a ewe and lamb per acre, and in some places not so much. In some of the most fertile pastures in Scotland, half an acre will summer a large ox, while, in other places, it will take from one to two acres to keep one of even a small description; and in some of the best sheep walks in Scotland an acre will maintain a sheep, while, in some of the most barren districts, a ewe will require almost as many acres to support her and lamb as she has teeth in front when full mouthed. From such remarks, therefore, may be seen the absurdity of attempting to draw any adequate conclusion as to the quantity of stock which a certain number of acres will keep—so much depends upon the fertility of the soil and size of animals kept upon it.[*] Experience must, therefore, be the only sure guide, always keeping in mind that it is better to understock than overstock, until something like a suitable number is discovered.[†]

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* If the stock be come to age and full growth, and intended for breeding or the dairy, it would be preferable to have them from land similar or equal to that intended for them; as animals reared upon poor pastures seldom prove good nurses or profitable supporters of the pail. But if young, they will improve for those purposes by superior keeping.

Opinions seem to vary very considerably respecting the time of turning stock into their spring pastures, and the manner in which they should be then stocked. Some will have it that they should be turned into the pasture as soon as there is any thing to eat, and stocked so hard as to keep it down during the season, for by this means, say they, the coarse grasses are prevented from running to seed, trodden under foot, and rotted by rain; [‡] while the advocates for grass being a full bite, and afterwards lightly stocked, say that the above advantages are quite overbalanced by the superior thriving of the stock. But the probability is, that both of such opinions may be right if not taken in a general sense, and properly applied; for the former may be supposed to be correct when applied to rich fertile lands always retaining a sufficiency of moisture for the further nourishment of the grass, and where no dependence is placed on the summer growth being turned to good account in winter; and the latter may be conceived correct upon light sandy soils, particularly in a dry climate, where, if a pasture is once eaten bare, and a hot scourging season follow, it will remain so; and where the summer refuse is the principal winter dependence,* which will be most readily devoured when nothing more palatable remains, and is sweetened by a night or two of frost. In short, hard stocking, that is, in such a manner that grass may be equally eaten and kept from getting too long,† will answer when the herbage is all of a superior quality and pretty equal; but where this is not the case, and animals are compelled to eat herbage of an inferior quality, it must be evident that they will not thrive so well, not only from that kind of grass being less nourishing, but as long as the least part of the finer particles is to be seen, they will not put a mouth upon the other; conseqnently, must have many a hungry belly, which will always prove bad management in any shape it can be taken. Indeed, to compel any kind of stock to eat during summer‡ the '*tath*'§ of their own excrement, is next to starvation; such close feeding, therefore, cannot be combined, in almost any situation, with good thriving. But as one kind of animals will readily eat the '*tath*' or refuse of another,‖ hence arises the propriety of occasionally grazing the same land with different kinds of stock during the season;* and which must be increased or diminished according to the kind of grass that requires most to be kept down. Upon lands newly laid down to grass, and such pastures as are of a wet soft nature, the smallest animals will do less injury by treading with their feet: it is therefore preferable to pasture the former with sheep, should the situation admit the propriety of such a stock being kept, and such parts of the latter as may be found in farms ought to be grazed as early in summer as they will admit; for, if overtaken with autumnal or long-continued rains, the health and constitution of the animals will be materially affected.† In situations liable to be so much affected with extremes of drought or moisture, varying to such a degree that a certain quantity of land will one year keep fifty head of animals in good condition, while, in another, it will not be able to keep from thirty to forty of the same kind from starvation; it would, in such cases, be proper not to keep a full breeding or dairy stock, but keep in part, a bought in or moveable one, which can be procured in such numbers as the appearance of the summer or winter provisions may dictate. This will prevent the loss occasioned, by being in some seasons obliged to dispose of part of the stock at perhaps a very unseasonable period, the necessity of which becoming general in a country is not unfrequently taken advantage of by dealers, or if partially so, even by your neighbours; and, in like manner, advantages are taken by the replacing of such stock, when a more favourable season requires it. The further propriety of adopting different systems of the same or different kinds of stock upon the same farm in some peculiar situations, must be obvious, when a farm will summer more stock than it will winter, or from there not being a suitable proportion of breeding land to the quantity best adapted for rearing;[*] both of which are frequently the case in many of the grazing districts. The above is further necessary to meet in part the change of demand in the market; but more particularly in situations far distant from it, where a few animals of different kinds and ages may be sold to such dealers as may attend the small neighbouring markets each for his own description of stock: such dealers will readily purchase small lots of different kinds, when their inclinations or purses forbid them from asking the price of a large lot all of one description. But the variety of pasturage,[†] the kind of demand in the market, and the effect which the changeableness of the season has upon the herbage, must be the best and only guides to direct when such a variety of system must or must not be adverted to; the two former of which are likewise the best dictates for the most profitable ages to be kept, or for sending any kind of stock to market.

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[*] It might be expected (as is common) to have here given a statement what a certain description of land would maintain per acre of a given kind of stock: but from the different degrees of fertility of land, apparently the same from description, it may perhaps be as prudent and less injurious to decline the task.

[†] In situations where no dependence can be had upon a suitable supply of winter provision, either from the produce of arable or meadow lands, or by preserving a certain portion of pasture during summer or autumn for that purpose, it would certainly be erroneous for a farmer to keep his lands fully stocked; whilst, if such are to be had, let it be remembered that pastures left rough in autumn and not close eaten down, are not so good the succeeding spring and summer. But the overstocking of a sheep stock not only extends to the producing of an inferior carcass, but likewise to a deficiency in the quantity and quality of the wool, and is productive of many fatal diseases, among all descriptions of stock, that would be otherwise quite unknown.

[‡] Complete Grazier. The Rev. Arthur Young's Essay: "Communications to the Board of Agriculture," vol. iii.

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* Such is the case in many of the highland districts of Scotland where there is a deficiency of meadow hay or other winter provender, and where it would not be practicable to confine the stock to one corner of the farm in summer and to another in winter, there being two kinds of herbage growing promiscuously over the whole; one requiring to be eaten during summer, and the other not till after receiving some of the frost in winter; consequently such land requires a sufficient stock to have a full range, so that they may select the summer food in its season, and not to be so numerous as to be compelled to eat the winter food out of season.

† New pastures are much better for being closely eaten down, particularly when there is a proportion of ryegrass, which, if not kept down, will soon run to seed and be entirely wasted.

‡ Summer is more particularly alluded to, because such grass will be readily eaten after receiving a little frost.

§ Strong grass produced from the excrement of stock, when not regularly spread upon pastures, is, in some places, called '*tath*' or '*teth*.'

‖ Such refuse likewise proceeds from different kinds of plants being on the same ground, part of which, though rejected by some kinds of animals, will be graciously accepted of by others.

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* The above is most applicable upon enclosed lands where a fattening stock is kept, and it is customary only to allow them to eat the finest of the grass, and to let some of the store stocks follow to eat up the refuse, which would otherwise be entirely lost, from the necessity in some such situations of keeping all kinds of stock constantly in the house during winter for sake of the manure.

† Pasturing on such situations in wet seasons is frequently the cause of that consumptive disease called the rot.

I shall now proceed to make such remarks as are more particularly adapted to each system distinctively.

SECTION V.

REMARKS RELATIVE TO THE PROPER METHOD OF GRAZING A BREEDING AND REARING STOCK.

A variety of circumstances causes various methods of pasturing the above stocks necessary, such as allowing them to do so promiscuously and alternately upon different parts of a farm, or keeping each kind distinctively upon that land best calculated for them.* The former may be most advisable in situations all alike exposed or sheltered, where the different kinds of herbage are so promiscuously mixed as not to be particularly adapted either to the breeding or rearing system, but may be said in part to answer both: but even in such a situation, one method of pasturing will prove more beneficial than another; for, to pasture the breeding and rearing stocks promiscuously, as is too common, the rearing stock deprives the breeding one of part of the earliest and finest particles of the grass, which ought to be solely reserved for them. In order, therefore, to distribute the different kinds of herbage (which has been already allotted for each kind of stock) to their respective claimants in such a situation, the following is the most effectual; which I have seen partly and partially acted up to. It is common in most farms, such as are at present alluded to, that one part of them produces grass a little earlier than another, and that early particles are rising up indiscriminately over the whole.† Let such farms, therefore, be divided into four divisions,‡ either by fences or imaginary lines pointed out to the herd, and which ought to be divided in such a manner, that each may maintain an equal number of either neat-cattle or sheep throughout the season, provided they were constantly kept upon them. But as the making of such divisions will depend so much upon the nature of the soil and herbage,* this must consequently be left to be executed by the united judgment of the farmer and experienced herd, trusting that they will not neglect to have a suitable and constant supply of water in each division. Suppose, then, that the divisions are made to keep, throughout the season, as near an equal number as possible, and that each will maintain the whole stock kept upon the farm, during six weeks in spring and summer, with stated intervals, let No. 1. be the earliest grass, and No. 2. next, and so on, No. 4. being the latest grass upon the farm. First, put the breeding stock upon No. 1. on the first of April, allowing that to be the commencement of the grass, (which has been already recommended to be the beginning of either neat-cattle or sheep bringing forth their young,) and at the end of two weeks remove into No. 2, when the rearing stock must be put into No. 1, and so on, always shifting the breeding stock every two weeks, until the divisions have all been gone over once, and having put the rearing stock always immediately into such divisions as the breeding stock had left. But in going the second time over, the stock must be allowed to remain four weeks before shifting,† which will finish the summer feeding in each division as they go, not forgetting to keep a part of No. 1. for weaning clear of stock the second course of pasturing; and if a sheep stock, the time that the dams are leaving No. 4. the second time, will answer to put the lambs into the weaning park; and, should circumstances require, they may be allowed to join their dams as soon as they are clear of milk. The above method of pasturing not only affords the breeding stock an opportunity of always selecting the most nourishing particles, but it prevents the earliest grasses in each division from running to waste, or getting too long for the palate of sheep, before they are overtaken; it likewise keeps the pasture much finer than if it were allowed to get long and rancid. Should the situation admit or require the stock to be wintered out of doors, and to depend mostly upon their own exertions, they must, as soon as winter commences, be allowed to have a general run over all the divisions,* except No. 3, which should be preserved from the end of September, (being the period when the second course of grazing is finished, and when the stock gets general scope,) until about the beginning of March, when the whole stock should be kept upon it until the first of April, the period for turning the breeding stock into No. 1, and when the rearing stock must be put into No. 4. But the following table will more clearly demonstrate the above plan of grazing, and assist the comprehension of some necessary conclusive remarks which may afterwards follow.

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[*] In order to stock the rearing land properly and fully, a certain quantity of stock must be bought of such ages and at such seasons as the nature of the pasture and system pursued may best direct.

[†] From what has been already stated, it might almost be unnecessary to add that the coarser the summer and winter provision is, it is best calculated to be consumed by animals at or near their prime; for when they are either too young or old they cannot chew it properly, and it is consequently more difficult of digestion. Hence arises the propriety of wintering three and four years old cattle in preference to younger ones in districts where much wheat, straw, or other coarse fodder is raised.

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* It is a common practice in some extensive Highland breeding and rearing farms to have a certain portion of them allotted for pasturing in summer, and other parts of them for winter, which is considered to render the further provision of winter food unnecessary, particularly for sheep. Such management may answer in those farms which possess a considerable quantity of broom, heath, &c. not liable to be covered with snow in winter; or, where the herbage is never lost by such a covering, it may answer both cattle and sheep. Indeed, in many situations, no other plan can be adopted for want of arable or meadow ground; but, to depend upon such when recourse may be had to the raising of hay, &c. to provide against storms in winter, must be highly indolent, and productive of the worst effects.

† It may be said that in situations of an equal soil and all alike exposed or sheltered, there will be little or no variation as to the earliness or lateness of the herbage. But notwithstanding this, the above method of pasturing should be attended to, but the divisions might then be made according to the dryness and shelter of the ground, always allotting the wettest and most exposed divisions to be pastured during the driest season.

‡ It will be necessary to subdivide a part of No. 1. to be preserved the second course of pasturing, for weaning the stock.

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* It must be kept in view that an acre of grass which springs early, will keep more stock throughout the season than one of later growth, but equal in other respects.

† It must be remarked, from the stock occupying each division double the time the second course of pasturing, to what they did the first, that, on making the change, No. 4. is taxed with two weeks more than the others, during the first course, which may, in some situations, require it to be made a little larger than the other divisions; but this will in some measure be rectified by No. 4. being only required to keep part of the stock for one month during the second course. See table of pasturing, p. 310.

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* It is probable that each division may still contain a little summer refuse suitable for winter food, which, when taken collectively, will seldom prove more than sufficient. It is likewise necessary that stock in such a season should be allowed a general search for shelter, with which it is the herd's business to see that they are every night duly provided.

Method of grazing a Breeding and Rearing Stock alternately upon the same Pasture.

FIRST COURSE OF PASTURING.

April 1,	Breeding Stock	put into	No. 1,	and taken out	middle of April.	Middle of April,	Rearing Stock	put into	No. 1,	and taken out	end of April.
Middle of April,	do.	do.	2,	do.	end of April.	May 1,	do.	do.	2,	do.	middle of May.
May 1,	do.	do.	3,	do.	middle of May.	Middle of May,	do.	do.	3,	do.	end of May.
Middle of May,	do.	do.	4,	do.	end of May.	June 1,	do.	do.	4,	do.	end of June.

SECOND COURSE OF PASTURING.

June 1,	Breeding Stock	put into	No. 1,	and taken out	end of June.	July 1,	Rearing Stock	put into	.	No. 1,	and taken out	end of July.
July 1,	do.	do.	2,	do.	end of July.	August 1,	do.	do.	.	2,	do.	end of August.
August 1,	do.	do.	3,	do.	end of August.	September 1,	do.	do.	.	3,	do.	end of September.
September 1,	do.	do.	4,	do.	end of September.							

From the preceding arrangement, it may be observed, that No. 3. is not only preserved during winter, from its being most eaten when the stock begins the winter range, and, consequently, of less service during the beginning of winter, but from its being the only one which can relieve the whole for a time, so as to have each preserved a proper number of weeks previous to stock being turned into them in spring, according to the rotation above pointed out. For by putting the whole stock into No. 3. during the month of March,[*] and on the first of April putting the breeding stock into No. 1, and the rearing one into No. 4, these two last numbers have been clear of stock for one month, and No. 2. will have been clear of stock for six weeks, and No. 3. for one month, before the stock reaches them; such periods as cannot be accomplished by preserving any of the other divisions and pursuing the plan above suggested.[†] The remarks now made, relative to such a situation, are equally applicable to a breeding and rearing stock of neat-cattle and sheep, or even when any two different kinds of stock are kept; the one requiring the earliest and finest particles, while the coarser and later ones will serve the purpose of the other. But should the nature or extent of a farm not admit of the system now pointed out, for selecting the early and late grasses in their season, and distributing them to such stock as will pay best, a moveable stock might then answer, provided it were equally suitable in other respects;* for such animals as are most suitable for eating the early and finest grass can be bought first, and, when sold, replaced by such as will answer best for eating the later and coarser herbage. But should a farm possess the suitable breeding and rearing ground, as already pointed out, (section iii. p. 300, 301,) distinctly separate from each other, each system must then be pursued upon its respective ground, which may be done in a similar manner to that already described; or, where it would not be convenient or practicable to have so many divisions, a summer and winter run for each kind of stock might answer the purpose, always beginning to preserve that allotted for the winter in due time, which will be sooner or later according to the growth of the herbage.† However, the dependence on wintering stock by such means of pasturing will, in some seasons in almost any situation, and in some situations in almost any season, prove quite inadequate to its support during that season, so as to enable it to turn the grass of the following spring to a good account; and, instead of the stock being healthy and thriving in the spring, it will be half starved and diseased by hunger, and perhaps the number only forthcoming by producing a quantity of skins; therefore, to guard against such ruinous consequences, a suitable portion of meadow hay should be provided in summer for the winter provision, for although cattle or sheep may sometimes not require it, yet they will never suffer from receiving or refusing it. Having, in some of the preceding chapters, shown the requisite properties of both males and females, with their treatment both during the breeding and rearing season, in order to insure a good stock of whatever kind or species of animals; and now, in this chapter, enlarged more particularly upon the herbage and treatment for which each kind or species is best calculated; it may therefore be admitted that if any thing like justice has been done to the subject, the difficulty of rearing and keeping up a good stock may be removed. But in the latter case, something more is highly essential, viz. the annual draughting or setting of the stock, which is generally performed about the time of weaning,* if the 'culls'† are intended to be fed off with the autumn grass or by winter stall-feeding,‡ and if the fattening is to be delayed until the spring or summer following, the draughting is sometimes prolonged (if a sheep stock) until the time of putting the males and females together for propagation. But the most approved of time or method of draughting the breeding females of any stock, is that of doing so a year previous to their being sold off; and by putting them a little earlier to the males than usual, their produce may be weaned sooner than that of the females which are to be kept. By this method they may, according to circumstances, either be fed off upon the grass, or put into such condition as will render it an easy and early process in winter; whereas, if the weaning is retarded by late propagating, the dams, particularly if old, can scarcely either be put into saleable condition that season by the grass, or so as to be made fat the following winter. After what has been stated as to the proper age for stopping both males and females from breeding,§ it might be unnecessary to say much on this head; only, when aged females seem to retain a 'good mouth,' and good keeping is still visible upon them, if good nurses and possessing the other requisite qualities, such females may be continued a year longer, although it is bad economy to keep until a falling off of the mouth and carcass, &c. dictates the necessity of parting with them; for if for sale in a lean state, they will carry those marks to market with them, which will be nothing in their favour, and if to be fed off at home, they will retard their improvement very much, whether in the field or stall-fed, but more particularly the latter.* In either case, the keeping of females until they are so visibly old, is attended with considerable loss, which, in large stocks, ought to claim the farmer's most particular notice in preventing an evil for which a little attention in the draughting of the stock annually is the only remedy.

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[*] It may be said that No. 3. will not be able to support the whole stock during the month of March, from its having been eaten so late in the season, consequently will not grow much in winter; but from its being so long clear of stock, it will be well cleaned with the winter rains and sweetened by its frosts, so as to make the coarsest herbage a pleasant repast. It would however be proper to have this division to contain as much winter food as possible, which ought to be studied at the time of dividing. But there are very few situations but that from a little exertion arable or meadow land may be made to remove any risk of No. 3. starving the stock in March.

[†] It may appear to some that there is an impropriety in not keeping each division clear of stock for a certain time between the pasturing of the breeding and rearing stock, so that the grass may be allowed to spring a little; but it must be remembered that it is only the coarsest herbage that is here allotted for the rearing stock, which would be rejected altogether, if even a scanty supply of fine was offered along with it; besides, it would be depriving the breeding stock of its right.

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* Where a small capital and such a situation as above, meet, they should overbalance many inconveniences which might attend the keeping of a bought in or moveable stock.

† Where the herbage continues to grow late in the season the winter pasture may be eaten later in summer than when it ceases to grow early in the season.

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* If a cow stock, it will be necessary to draught them before admitting the bull among them in summer.

† The refuse or outcasts of a stock, or such as are getting too old for breeding, are, in some places, termed *culls* or *shots*.

‡ If culls are intended to be made fat by stall-feeding in winter, they ought to receive superior treatment to the rest of the stock during summer or autumn.

§ See Table, introduction.

SECTION VI.

NECESSARY REMARKS FOR THE PROPER MANAGEMENT OF A FATTENING FARM.

From what has been already set forth in pointing out the land most suitable for fattening,† as well as the kind of stock answering best any particular herbage or situation, by keeping in view some of the general remarks,‡ the following additional ones ought to prove sufficient for turning the stock and grass upon a fattening farm to the best account. Divisions ought to be made, with good fences, in proportion to the size of the farm and quantity of stock kept upon it; for, by putting a great number of cattle or sheep into a small field, one half of the grass is lost by being trodden down and covered with manure, from their being obliged to adhere so long to the same place; and by putting a small number into a large field, they run over the whole of it, minutely picking out all the sweetest and best of the grass, leaving a part even of the feeding quality to go to waste, which they might otherwise be made to eat, and to great advantage. Dividing a fattening farm, in proportion to the quantity of stock it is calculated to keep, is therefore a principal object. But as such will vary according to the quality of the soil, goodness of the climate, and kind of stock kept, nothing but a little experience can possibly adjust the proportion alluded to, as the most demonstrative point requisite in regulating such an adjustment, after having fixed upon the kind of stock most suitable to the situation, is to discover what an average acre of the land, appropriated for fattening, will make fat during the season: and in making such a discovery, always err on the side of the grass being too much for the stock and not too little for it, the one evil being more easily remedied, and with less damage than the other: for if there is too little stock upon the pasture, it is easy to augment, and the loss is only what improvement the augmentation would have made had it been applied in due time,* the former stock suffering nothing by the mistake; whereas, if a stock is too large, there is a necessity for selling such supernumeraries at an unseasonable period, and perhaps at a considerable loss. But the loss does not here rest entirely on the surplus number, as it does in the other case on the deficient number, as the discovery is only made by either observing a falling off of the grass or cattle; which, if the former, it is perhaps too late in the season for it to recover, and, if the latter, perhaps they may have received an irrecoverable check for the season; consequently the loss will operate upon the whole stock in proportion to the mistaken number. Such remarks are equally applicable to neat-cattle and sheep, and the various modes of shifting them from one pasture to another may, with propriety, be pursued according to the growth of the pasture and dryness of the land.† But, for example, allowing neat-cattle to be the stock kept, and supposing that a farm, or part of one, consists of 152 acres entirely adapted to fattening, and that it has been found by taking an average of a few years that it will make fat 100 cattle, of such a kind as has likewise been found from experience to be most suitable to the situation; which, by allowing two acres for fences and other waste ground, will

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* See section on fattening, page 128.

† Sect. iii. p. 300.

‡ See sect. iv. p. 302.

* But the loss may extend still farther if the pasture is allowed to get too long from the quantity and quality of the pasture being diminished. See sect. iv. p. 303.

† See note † p. 307.

be one and a half acre for each animal; and further, that the grass upon the said farm becomes a full bite* on the 1st of May, and begins to lose its nourishing quality at the expiration of September. Under such circumstances, therefore, the following method of grazing may be found most commendable. First, divide the ground into four grand divisions,† which will contain thirty-eight acres each, including waste ground: let each division be subdivided into four fields of nine and a half acres, which, being supplied with water, rubbing posts, and temporary sheds for the cattle to resort to in warm or boisterous weather, will be ready for the reception of the cattle in rotation as they may produce early or late grass. Next divide the cattle into four lots of twenty-five each, making them as equal in size as possible, each lot having their own grand division allotted them, containing four fields, Nos. 1, 2, 3, 4, the largest cattle having the best division, and the next largest the next best, &c. grazing each lot first in their respective early fields, and so on in the next earliest. To prevent the grass from getting too long or rancid (which consequently causes a great waste) and likewise encourage its growth, let each lot be grazed two weeks in each field the first time over, and three weeks the second course,‡ making in all twenty weeks, the time supposed for the grass to be in a proper state for fattening, viz. from the beginning of May until the end of September. But in some pastures, although the herbage in general may be best calculated for fattening, yet a certain portion of it consists of an inferior or coarser kind, which, if cattle are made to eat it, will retard their fattening. The system, therefore, here, for consuming the whole to the best advantage, must be by grazing alternately with different kinds of stock; for the animal once accustomed to select the fine particles of grass, will almost starve, and suffer a great waste in condition, before it will touch the coarser. In this case, therefore, the same number of acres already noticed will not be capable of making fat the number of cattle specified, although they will fatten and rear, or maintain collectively, the same number: hence, the fattening stock must be diminished, and replaced by others not intended for that purpose,* according to the quantity of coarse herbage, and always as the fattening cattle are taken out of one inclosure (agreeably to the plan already suggested in page 308, for a breeding and rearing stock) the lean ones must be put into it: however, it may be advisable, not to let the lean stock commence following until the fattening ones are going over the fields the second course.† But although the system of dividing and grazing a fattening farm now recommended will, in many situations, hold good, yet it must be varied according to circumstances, the grand divisions being made larger or smaller, according to the extent of the farm, or the variety of fattening herbage;* but where it is necessary to keep one kind of stock following another, the subdivisions cannot be fewer than three, otherwise a division cannot be preserved for a suitable time to have a fresh bite for the fattening or leading stock; as it has been already suggested, that when one kind of stock is to follow another in order to eat up refuse, the one must be put into a division immediately on the other's leaving it.† Should, however, no following stock be necessary, the divisions may be reduced to two, provided the early pasture can be so separated from the late. But when a farm is extensive, and possesses here and there a quantity of acres of early grass, situated perhaps at some distance from each other; from what has been stated, therefore; the propriety of dividing such a farm into at least double the number of divisions to what there are early fields, will not only appear obvious, but likewise that the stock must be divided into as many lots as there are early fields, so as to top-eat them all at the same time. Hence arises the preference which has been given here to four divisions and four lots of cattle in such situations; which not only affords an opportunity of the grass being more minutely eaten in due season, but likewise removes the disadvantages attending one kind of stock grazing along with another, or from there being too many together.‡

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* A full bite is absolutely necessary in pasture intended to fatten, for then the animals get soon satisfied with little labour or fatigue; which consequently encourages much lying and sleep, two great promoters of fattening.

† In making the above divisions, it must be particularly studied to have a subdivision in each, producing the earliest grass, which may arise either from a finer quality of soil, or a more sheltered and better exposure: it must likewise be particularly observed to have water in each, so that it may be more easily distributed among the subdivisions.

‡ By the frequent changes above recommended, the grass is all overtaken and cropped by the cattle before it gets so full-grown as to become stationary; and by such frequent cropping, the grass is always preserved in a sweet feeding state, from the fresh shoots which are thereby encouraged. Should any of the cattle be ready for market either during the first or second course of pasturing, they may be sold and replaced with such as will feed off during the season; or, if too late in the season, they may be prepared for finishing early with stall-feeding in winter.

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* In some fertile districts where heavy cattle are kept, and when their refuse is of a feeding quality, smaller cattle, such as Highlanders, are made fat by following as above, and sheep may be made fat upon such land after the cattle are removed.

† Coarse herbage being much later than fine, little of the former might therefore be ready for the lean stock the first course, (which is allowed to commence in May,) which might cause them to adhere too closely to the fine pasture, and thereby retard its progress so much as to interfere with the leading or fattening stock the second course, which commences in the beginning of July, when grass may be said to have attained its acme of maturity and luxuriance.

SECTION VII.

A DAIRY FARM.

From what has been stated relative to the management of cows previous to their having calves and afterwards,[*] the treatment necessary for rearing them for the dairy,[†] the general remarks upon a dairy stock,[‡] and the hints now given in the last section, respecting the lands best adapted for this purpose; it might be conceived that a very few brief remarks were now only necessary to complete the management of a dairy farm. First, let the old adage and just maxim be constantly kept in view, viz. "that a cow gives her milk by the mow:" hence arises the necessity of always supplying cows with a due proportion of fresh, suitable, seasonable, and clean food, as likewise a constant supply of pure water; to all of which they ought to have free access with as little travel or fatigue as possible; consequently it will be necessary to have the pasture and byres contiguous to each other. Further, a dairy stock should always be well sheltered, kept warm, dry and clean, and milked clean[§] three times a day in summer and twice in winter, at regular intervals. During the warmest months, they ought to be kept in the house a great part of the day, and fed with cut grass, and allowed to remain out all night. But when the nights begin to get long and cold, they should be housed, not forgetting to keep them eating cut grass, tares, late cabbage, or such kind of food, when in the house, either during the heat of the day or in the evening. The method already pointed out for pasturing a fattening farm may with propriety be pursued upon a dairy one, always pasturing the fields farthest from the houses (if other circumstances will admit) in cool weather, such as early in spring, or in autumn;[‖] at which periods cows will receive less injury from travelling, not only from the cool state in which they may be taken to and from their pasture, but, from giving in general less milk at those seasons, will be able to travel with more ease.[*] For the treatment necessary for milch cows when constantly in the house, see remarks on stall-feeding, pages 125—128, which are in every respect equally applicable to a dairy stock. When cows receive a great proportion of turnips, the milk and butter acquire a very strong taste of them; this however may be greatly remedied by feeding first in the morning with straw or meadow hay, and with turnips and straw alternately throughout the day: but in order to remove it more completely, let a small quantity of pounded nitre be put into the pail before commencing to milk. There are various ways of sending the produce of the dairy to market, of which the situation, kind of cows, and nature of the food ought to be the guides, as to the most profitable system which ought to be pursued: but of whatever kind it may be, the following general remarks are applicable, viz. that a dairy should be so situated and constructed, as to be cool in summer and warm in winter, retaining an equal degree of temperature throughout the year;[†] likewise that it is dry, being completely free of damp; and that a free circulation of air (but not wind) can be admitted when occasion requires;[‡] that the necessary utensils are of a proper description,[§] and always kept scrupulously exact in cleanliness,* which is seldom properly accomplished unless under the immediate inspection of a suitable housewife, and without which the keeping of a dairy should never be attempted, however favourable circumstances may be in other respects; in short, cleanliness and a locked door are two predominant characteristics of a well-managed dairy. I am well aware that, when treating on the complete management of a dairy farm, I should have entered upon and gone through more minutely the requisite situation, construction, and other conveniencies of a sufficient dairy, as well as the processes of manufacturing milk in the various ways in which it might or ought to be performed, in order to turn it to the best advantage; but as these are now so generally understood, and from there being such numerous, minute, and valuable treatises on the subject already set forth to the public, † it might consequently be deemed unnecessary and superfluous to enter into the minutiæ of such particulars,—indeed the limits of this work completely prohibit it. Let it therefore suffice for the present to conclude with a few brief remarks relative to the making and preservation of butter and cheese.

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* It may be remarked that in some farms a division may be had suitable to the fattening of large cattle, and one for small ones, while another may be particularly adapted for sheep.

† See note † p. 311.

‡ The disadvantages above alluded to are numerous, viz. one kind of stock overawing, and eating the kind of grass which more properly belongs to another, and the injury at times which unspayed females receive from castrated males, as likewise that received by heavy cattle pasturing upon wet or soft land. For further disadvantages, see page 315.

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[*] Chap. ii. sect. 3, on Breeding, p. 102.

[†] Chap. ii. sect. 4, on Rearing, p. 118.

[‡] The pastures most suitable for milch cows are old sweet ones partly composed of Dutch and white clover, and the most suitable winter food for them is good meadow or natural hay and turnip, cabbage, carrots, or other succulent food.

[§] The propriety and necessity of milking cows clean at every milking, will appear obvious from the method generally used and recommended for putting a cow dry, viz. bleeding and taking a little milk from her every other day, but not milking clean. It is now found from experience that a cow yields more milk, during summer, when milked thrice than twice a day.

[‖] It is of advantage for uncalved cows to receive a little exercise daily.—See note ‡ p. 105.

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[*] Early in spring cows are seldom come properly to their milk, and in autumn they are beginning to fall off; consequently, about the warm months they are giving most milk, when they should have least exercise.

[†] From 50 to 55 degrees seems to be the most approved of temperature for a dairy.

[‡] The mouldiness which is invariably occasioned by damp, gives both milk and butter a bad flavour; and too much air or wind admitted into a dairy not only causes milk to throw up less cream in a given time, but cream (from its toughness in consequence) to produce less butter.

[§] The kind and dimensions of vessels used for the dairy are numerous, such as those made of wood, lead, cast metal tinned within, or earthenware, the former of which are preferable for performing the milking operation, and in making cheese, butter, &c.; but the latter (from two to three inches deep) for containing the milk until it throws the cream, &c. However, if a dairy is very extensive, the lead or tinned vessels will be more convenient, being from two to three inches deep, with a hole in the centre, stopped from below, so that the milk can first be run off, and then the cream.

BUTTER.

During summer, milk should be allowed to cool a little previously to its being strained through a sieve ‡ into the dishes where it has to throw up the cream, such dishes having been properly boiled or scalded before putting the milk into them; which process must be repeated regularly previously to a fresh supply of milk, always being careful that the dishes are completely cool * before they are filled with milk. Indeed, to accomplish this desirable and most essential object in perfection, two sets of dishes ought to be used, one always being preparing while the other is full of milk. This however is not necessary during winter or cold weather, as the milk must then be strained into the dishes warm from the cow, with a little warm water added, and the dishes even in a warm state after scalding, which will both facilitate and increase the throwing up of cream. The proper time for milk to stand before the cream is taken off is about thirty-six hours; but this must necessarily vary according to the season, for in many places milk will sour if allowed to stand more than twenty-four hours during summer,† while it will keep for forty-eight hours in some situations during winter, before it becomes the least tainted; but the nearer it can be kept to thirty-six hours without the cream being taken off, the better, as longer than that, in general, will be found of little service to the cream and detrimental to the milk for after-purposes, particularly if the making of skim-milk cheese be an object of consideration. The cream should be taken off carefully with a skimming dish with some holes in it, so as to let through the milk and retain the cream;‡ if a dairy is large, the churning operation may be performed every other day, more or less as circumstances may require.§ As to the

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* Nothing is more hurtful to the feelings of an experienced housewife, or thorough-bred dairymaid, than to attempt to explain to them the necessity of daily scouring and washing all the shelves and floor of a dairy, and scalding with boiling water all the utensils thereto belonging, previously to every time that they are used.

† See Dr Anderson's Essay on the Management of the Dairy, inserted in the third and fourth vols. of his Recreations in Agriculture, extracts of which may be found in the Complete Grazier, and Dickson's Agriculture, vol. ii. Many other useful hints on dairy management are likewise contained in Forsyth's Agriculture, vol. ii.; Parkinson on Live Stock, vol. i.; Marshall's Norfolk; Annals of Agriculture; Corrected Agricultural Report of Mid-Lothian; Young's Six Months Tour; and in several numbers of the Farmer's Magazine.

‡ There are various kinds of sieves or strainers, made of hair or wire — Silver wire is recommended by Dr. Anderson; but I have found nothing to

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answer so well as a wooden bowl, with an open bottom, covered with fine thin gauze, as both can be separated at pleasure, and well cleaned.

* Dishes not properly clean or cool in summer will taint the milk almost immediately: a little cold water put in the bottom of each dish greatly forwards and increases the throwing up of cream during warm weather.

† Cream must always be removed from the milk before it becomes the least tainted or sour, otherwise good butter cannot be expected.

‡ If the milk is kept in any of the large vessels already noticed, with holes in the bottom to run off the milk from the cream, such holes can be covered, if found necessary, with such gauze as will completely prevent any of the cream from running off with the milk.

§ The churning must be regulated by the keeping of the cream, which most suitable kind of churn, opinions seem to vary. The old upright one is perhaps as good as any; only, when a dairy is large, a barrel or box churn is most suitable :* but of whatever description, let the operation be performed in a constant regular manner, neither too fast nor too slow ;† only, a quicker stroke is necessary at first in winter, and, when the butter begins to appear, finish with regular slow strokes; while the reverse is requisite at commencement in summer, as quick strokes will then make the butter soft and oily. Before commencing this operation, let the churn be washed out with boiling water in winter, and cold water in summer; then strain the cream through a thin canvass bag into the churn, and put a little of either warm or cold water, as the season may dictate, into the churn occasionally, when churning. If in summer, the churn ought to be placed in a cool place, and immersed in a vessel of cold water about one foot deep; but if in winter, it will not only be necessary to place the churn near the fire immersed in warm water as above, but during severe frost the cream pitcher must first be placed near the fire, occasionally turning it and stirring the cream until it is thoroughly softened and become a little warm.‡ When

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time may be much prolonged by stirring it once or twice a day with a clean stick kept for the purpose: but when the weather is warm, the oftener butter is made, it will not only be finer flavoured, but will keep better.

* The box churn I have found, from experience in a large dairy, to be preferable to all others. It has the advantage of churning with ease a large quantity at a time, and from its simple construction is easily kept clean, and the butter separated from the milk with greater facility and exactness. It is simply a box of about three feet high, eighteen to twenty inches broad, and from two to three feet long, with inside work similar to that of a barrel churn, only it turns round while the barrel work is stationary: the cover is the full size of the box, made to take completely off, and the inside work lift out, so that the butter can be easily removed and the churn properly cleaned; there is a hole in the bottom, shut when churning, and opened to remove the milk from the butter.

† If irregular and quick turns are given in summer, the butter will, in consequence, ferment and become ill tasted; and if in winter, it will not come at all.

‡ Such means of facilitating the making of butter should, however, be avoided as much as possible, as they greatly decrease the quality and injure the appearance.

butter is properly formed and collected together in the churn, it must then be separated from the milk and put into a wooden vessel, (previously scalded and rubbed with salt,) and properly washed with pure cold water, until all appearance of milk is removed from it:[*] work and press the butter well with the hand until it form a sufficiently firm substance, then draw a table knife through it in various directions, in order to remove any hairs that may have escaped the sieve, occasionally sprinkling a little salt until (by the taste) it is found to have enough. After the butter has been well wrought in this manner, so that the salt may be properly dissolved and incorporated with it, then make it up into rolls of one pound weight each, either for sale or use. But if it is intended to be potted or kitted, put a little salt into the bottom of the pitcher or kit, then put in the butter, pressing it firmly down with the hand, leaving it rough and not smooth (as is too common) on the top, and cover it all over with salt, which must be carefully scraped off when the next churning is put into the pitcher or kit.[†] Such treatment will be found perfectly sufficient for preserving butter for a long time in a fresh state for all ordinary purposes; but if a superior colour or flavour is wanted, either for use or to suit the market, instead of making up the butter with common salt alone, do so with a mixture of sugar, saltpetre, and salt, properly incorporated: one ounce of such mixture is sufficient for one pound of butter.[‡] The best time for potting butter is in spring or autumn when the weather is rather cool; but adding a little of the juice of carrots to cream before it is churned in winter, will make butter, although not equal to that made in summer, have a resemblance to it both in flavour and appearance. There is, however, still another method much in use, and very deservedly much approved of for kitting up butter, particularly for exportation. Having prepared butter in the usual manner, as has been already described, with common salt; previously to its being put into the kit, a little is melted and poured over the bottom of the kit, which, when filled, is perforated with several holes, from top to bottom of the butter, and filled up with pickle made of salt strong enough to swim an egg; then a linen cloth, moistened in melted butter, is neatly fitted over the top, the lid properly secured, and a little of the melted butter is run into the crevices; which so completely excludes the air as to prevent the butter from becoming rancid, and preserves it much longer in a proper state for use than many other methods commonly practised.

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[*] Washing of butter is much disapproved of by many, and particularly Doctor Anderson, who says that it injures the quality very much; but with due deference to the Doctor's skill in these matters, I must beg leave to differ from him in this particular, having witnessed the good effects of repeated washing of butter with pure cold water, for the last twenty years; and I have at present a dairy of ten very superior cows, and although the person who superintends the making of the butter is not a regularly bred dairymaid, yet the butter made under her inspection is admired by all who try it, and it comes out of the pots twelve months old, as rich, pure, and well flavoured as it was the day it was put into them: which butter is manufactured exactly in the way above described.

[†] It is of advantage leaving butter rough when a kit is not completely filled, as it mixes better with the next layer put above it, which adds much to its proper preservation.

[‡] One ounce of saltpetre, two ounces of sugar, and one pound of salt, are suitable proportions for the above mixture.

CHEESE.

The same cleanliness and preparation of vessels, &c. are requisite in making cheese as have been already recommended for making butter, although there are a greater variety of ways in making it. But the difference in the quality of cheese, in various parts of the kingdom, proceeds more from the nature of the pasture or other food from which milk is produced, the state and kind of materials made use of, than from the actual process of making it. Still a visible difference may be observed in the quality of cheese in many counties, which can only be ascribed to the method of making, and attention in preserving it afterwards, all other advantages being quite similar. I regret that the protracted state of this work will not admit of a particular description of the various modes of making cheese in several places so much famed for that art; but this, however, I conceive to be less necessary, upon the supposition that one good system of making and preserving cheese is equally applicable to all counties, notwithstanding that the process may vary a little, owing to the kind wanted, or purpose for which it is intended. The first consideration is to have the runnet properly prepared for coagulating the milk; for if there is any defect in this particular, it will not only retard the process of making, but injure the quality of the cheese, and may be the means of preventing its keeping any time for use. Runnet ought to be made from the maw of a calf which has entirely been fed with new milk; and, as an improvement, let the calf have its fill of it a little before it is slaughtered, so that digestion may not be perfected; open the maw and wash it well, reserve only the skin, and, after being well salted, hang it up to dry, extended with pieces of wood, and in ten days it may be steeped in salt and water, and bottled up for use.* Having then prepared the milk, which must be about as warm as when first taken from the cow, or rather a degree colder, put in the runnet and stir it well; and in about an hour the milk ought to be formed into a proper substance for beginning to make the cheese: this is likewise the proper time for adding a little Spanish arnotto for colouring,† which does not injure the taste, and much improves the appearance. When the milk is properly coagulated and cooled, the whey must be separated from the curd, gently with a bowl, breaking the curd as little as possible: a few cross cuts with a knife will facilitate the separation of the whey, after which put the curd into a canvass cheese-bag, and place it upon a barrow laid across the vessel which holds the whey, and, with a piece of board placed upon the bag, press it well until all the whey is completely removed; then turn the curd out of the bag into a dry clean vessel, and there work it very small with the hand,* at the same time applying a sufficient quantity of salt, for which the taste will be the best guide. Next place the cheese-cloth over the vat intended to make the cheese, and having filled it a little above the edges with the curd, fold the corners of the cheese-cloth smoothly over the top, and place the lid over it, which ought to be rather smaller than the top of the vat,† and place it in the press. The cheese must be turned every two hours for about half a day, and a clean dry cloth applied to it; and in about twenty-four hours it may be removed to the cheese room, if then thought sufficiently pressed. Although the cheese may now be said to be made, yet many a good one is completely spoiled after it has come this length, from inattention afterwards. Great care is therefore not only necessary in drying cheese, but in preserving it afterwards. Cheese, when taken from the press, should neither be kept in too dry nor too damp a place, but dried by degrees; for if done hastily it is apt to crack, and is thereby liable to much injury from the fly. It should be turned twice a day for the first ten days, and well wiped with a dry cloth, as likewise the boards on which it is commonly dried; which boards ought frequently to be well washed with warm water. After a cheese is considered to be dry enough, it ought to be kept in a medium state, neither wet nor dry, being occasionally turned and wiped with a dry cloth. In a similar manner to what has been now described, is the making of cheese carried on in various noted districts for that purpose both in England and Scotland;

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* Runnet is prepared by steeping the maw (after being well salted and dried) in about two quarts of lukewarm salt and water about twenty-four hours, and then bottling it up. The same maw will do to be salted, dried, and steeped a second time. Some spices, such as cloves and cinnamon, &c. improve the runnet, by giving the cheese a fine flavour. As this kind of animal acid is very apt to become putrescent, such must be guarded against, by applying a sufficiency of salt when runnet is making; for good cheese need never be expected, if the runnet is not entirely free from putridity. About a tea-cupful of this mixture is sufficient to coagulate milk for a large cheese; but no exact quantity can properly be stated, as it must necessarily vary according to circumstances.

† About one ounce and a half of arnotto will be found sufficient for a cheese of fifty to sixty pounds weight.

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* It is common in some places not to rub curd so small as above recommended, but allow it to stand a few hours to stiffen after being separated from the whey, then cut it into thin slices, and press it in the vat until it forms a solid substance. This is more commonly practised in making thin cheese. It must however be observed that cheese made in this way is more apt to get hard than when the curd is rubbed and broken small.

† The covering being made as above, allows the pressure to have a continued effect as the whey absorbs and the curd falls below the level of the top of the vat. The vat must have holes round the sides and in the bottom to allow the whey to escape.

but let it be remembered, in addition to the above rules, although ever so rigorously adhered to, that, in order to make or imitate Cheshire, Gloucester, or Wiltshire cheese, milk warm from the cows must be the chief ingredient; and if Stilton is attempted, the cream of the night's milking must be mixed with the new milk of the following morning.

SECTION VIII.

ON PREPARING HAY FOR WINTER PROVENDER.

The first essential point to be considered here, is the proper time for removing stock from the meadow ground intended for hay,* which may vary according to the nature of the soil or climate; for if the ground is such as will not suffer materially from drought in summer, and the climate admit of hay being properly made late in the season, such a situation may with propriety be pastured longer in spring than one liable to be burnt up in summer, or flooded soon in autumn, as in the latter case it is necessary that ground should have a thick covering of grass early in the season, so as to prevent in a great measure the pernicious effects of a dry scorching summer, and that the hay may be secured against those of a wet autumn. I am well aware of the necessity in many situations of encroaching upon the hay ground too long in spring, having no other dependence to keep the stock from starvation, until the pasture grounds are sufficient for its support; but I am likewise aware that such necessity of encroachment too frequently proceeds from having once commenced it; consequently there is a continual deficiency of the hay crop, which, by serving it out in scanty portions, tends merely to keep in the life until something like support appears on the hay ground in spring; whereas, if such ground was early preserved, the hay crop would be more abundant,* and hence remove the necessity of pasturing upon the meadows at all in the spring,† by there being a sufficiency of hay to support the stock until the pasture ground was adequate to it. But notwithstanding that all the precautions and exertions of raising a good and plentiful supply of hay are used, still it may occasionally happen that they may misgive either from an unfavourable season for its growth, or being made and properly secured, or a long severe winter may completely exhaust an abundant crop of hay: such accidents as these may again reduce the farmer to the necessity of encroaching upon the meadow ground. Therefore, to guard against the above casualties and their ruinous effects, let the farmer always have a certain quantity of hay in reserve, ‡ and when such a surplus quantity is not required in one season, let it be eaten the following one, § and replaced with new hay. There is another necessary precaution to be used in the preservation of meadow ground, viz. that of not pasturing it with heavy cattle in a wet season, which, by poaching it with their feet, not only reduce the quantity of hay, but injure the quality very much, in consequence of the stagnated water remaining in the foot-steps. Having therefore guarded against this evil during the autumn and winter, as likewise condescended upon the proper time for removing the stock in the spring,[*] let the meadow be cleared of all obstructions to the scythe, and bush-harrowed or rolled according to the nature of the surface.[†] Being then kept free from all trespass, the farmer's particular attention is next called to the proper time of cutting.

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* If the meadow has been irrigated, it ought to be pastured with neat-cattle, especially milch cows, in the autumn, but on no account with sheep at that season, as it would infallibly give them the rot.

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* Spring being the season for grass making the most luxuriant shoots, if it be repeatedly eaten down at that season, such an abundant crop of hay cannot be expected, as if it had been preserved.

† Although it is not prudent in many situations to pasture in spring ground intended for hay, for reasons already assigned, yet in others it is highly advisable in order to prevent a too luxuriant growth, which is generally accompanied with lodging and waste of crop. It is likewise sometimes necessary when a support for early lambs is wanted and no other substitute can be commanded.

‡ Should a farm be so situated and of such a nature that an extra-supply of hay cannot be had by the utmost exertions of improvement or otherwise, but is merely able to produce as much as to support the necessary winter stock in favourable seasons; the farmer ought, in such a situation, even to reduce his stock for a season, until he has laid up such a quantity of hay in store, as to be proof against the greatest failure of a hay crop, or the utmost severity of a long winter, and which ought never, even in such cases, to be completely exhausted. It will, however, unavoidably happen that great encroachments must be made upon the extra-quantity of hay in store; let such therefore be replaced as soon as possible, by savings in plentiful and favourable seasons.

§ Allowing that old and new hay have been equally well got into the stack, and likewise of equal quality, the former from age will have lost as much of its flavour as to make any kind of stock prefer the latter; consequently it ought to be given during the greatest severity of the winter. See page 117.

MOWING.

If this operation is not performed in due season, a considerable loss will be sustained, whether it is executed before or after the proper period; which is when the average of the plants in the field are in full blossom, unless there is an appearance of loss from the grass being lodged, or having become yellow, in which case the mowing should be commenced, whether the grass be in full blossom or not, but not otherwise; as when grass is cut before it is in full blossom, the juice, not having then properly circulated throughout the blade, will, when converted into hay, shrink much, and consequently cause a great falling off in quantity; and the quality is much injured when allowed to run to seed before it is cut, as the juice then has partly left the stalk; whence the hay becomes hard, and of similar provender to straw. Hay exhausts the soil in a certain degree, but infinitely more so when allowed to run to seed; which ought likewise to be a considerable inducement for cutting grass before it arrives at that state. But some prefer cutting early, without adhering to any other rule than that of saving by the second crop what they may chance to lose by the first being cut too early. But should the first not seem to be stinted in its growth, but have a thriving and luxuriant appearance, let such advocates for too early cutting remember that "a bird in the hand is worth two in the bush." Grass should never be cut wet, particularly if the weather will not admit of its being immediately shaken out of the swath, and the necessary process of making seasonably executed. Cutting ought to be performed as neatly and close to the ground as possible, many advantages arising from it; for it must be remembered that one inch of hay at bottom is worth two at the top, and that the goodness of the second crop does not depend upon the length of the old stubble, but upon the new shoots from the root of it; consequently the shorter the old stubble is, the more free and luxuriant will the new shoots arise, and be much closer eaten when applied to grazing by any kind of stock. If grass is an average crop, and possessing every advantage to the mower, he will cut down with ease a Scotch acre per day.

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[*] No stated period can properly be here given, as it is liable to variation, according to circumstances already noticed, even from February until April.

[†] See next chapter, on the improving of Meadow Lands.

HAY-MAKING.

This is a process, wherein the anticipated good effects arising from the farmer's former exertions in raising a plentiful supply of hay are too frequently buried; for although quantity may be obtained by the most indolent haymakers, yet quality is only to be secured by the expert and attentive; and it will most generally happen, that one stone of hay secured by the latter will have as much nourishment in it as two by the former. There are various modes of making hay recommended, and as many practised; but as there can be but only one opinion prevailing as to the best hay being that of a fine, green, fresh colour, having a sweet smell and flavour; so I trust that one general opinion will prevail that such hay can only be insured by paying attention to the time already recommended for cutting, and something approaching to the following management afterwards.

It is necessary to have a plentiful command of mowers* and hay-workers, so that the work may be completed each day in due season; for in the outset there must be kept constantly in view, throughout all the different necessary operations in making hay until it is secured in the stack, the old maxim of 'making hay while the sun shines,' or, more strictly speaking, after the dew has evaporated in the morning, and before it falls in the evening. Allowing the crop to be luxuriant, let the hay which is cut down in one day be properly shaken out of the swath, and spread in the morning of another day, provided the weather is dry; but if wet, it may be allowed to lie some days in the swath, occasionally turning it to prevent its becoming discoloured. After this, it may be turned once before noon, and again after it; and before the dew falls, it ought all to be put into small foot cocks,* and so to remain all night. Next day, after the spreading and shaking of the new-cut grass are finished, these cocks may be turned over with the rake, or if much flattened with rain, &c. they may be shaken up with the hand, so as to admit a circulation of air through them, and before night put into cocks a little larger if the day is favourable; and so on, increasing the size of the cocks every night as the hay becomes drier, being always turned or shaken up daily until sufficiently dry for putting into large cocks,† where it ought to receive a gentle sweat: and before being put into summer or winter stacks,‡ on the appearance of a fine day they may be turned and shaken

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* The number of mowers must be regulated according to the quantity of hay and the state of ripeness it is in, and the number of hay-workers accord-

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ing to the state of the weather; for in fine dry weather double the number are sometimes requisite to that in damp weather. In some places two or three people are allowed to one mower, and in other places five; but as to this no just criterion can be given.

* Foot cocks are made by simply putting together a small particle of hay with the rake, in the form and size of a molehill; when the crop is good, they may be made of such a size as to be about two feet asunder.

† The size of the above-mentioned cocks are generally as much as can be built on with the hands without tramping with the feet, being dressed with the rake, and brought to a point so as to turn rain.

‡ It is a common practice where the quantity of hay is large, that it is made into small summer stacks, about two cart-loads in each, which secures it from the weather as it becomes ready, until the whole is finished and ready for putting into a winter stack; which ought not to be delayed, as there is generally a great waste in tops and bottoms when the summer stacks are allowed to remain long.

up; when, in an hour or two thereafter, carrying into the barn or stacking may commence, always taking care not to turn up more of the cocks than what can be stacked before the dew falls in the evening. But on the event of a light crop and a very dry season, the hay ought not to be shaken out or spread,* but merely turned in the swath the second day, and put into small foot cocks upon the third, then dealt with as already noticed. I have frequently made excellent hay in this manner, even where there was a great proportion of clover; which requires to be well dried, otherwise it will heat too much in the stack.

In short, the principal art in making good hay seems to consist in exposing it as little as possible to rain, dew, or too much sun, all of which injure the quality very much: keeping it therefore, always during the process of making, in such a state as to admit the circulation of air through it, without exposing it to such reducers of quality, must be a general rule to be observed: hence arises the advantage of making hay in the form of cocks throughout the day, and having it always put up in that state during the night. The next most critical point to be ascertained, is to know when hay is in a proper state for stacking, so that it may neither heat too much nor too little; for if the former, instead of being nourishing food to any kind of stock, it proves of a reducing and weakening quality, particularly to horses, from its powerful diuretic effects; and if the latter, it will want that palatable flavour which some kinds of hay can only acquire from a gentle sweating in the stack. It therefore becomes difficult to explain the precise state in which different kinds of hay ought to be before it is put into large stacks; this is more minutely acquired by practice: only, one general rule must be attended to, that the hay is thoroughly dry before stacking is commenced, and that hay of a fine quality, or mixed with clover, must be more deadened than that of a coarse nature without clover: the former should only be allowed to sweat a little in the tramp cocks or summer ricks, while the latter ought to have a gentle sweat in the barn or winter stack.* These few limited particulars now stated, relative to hay making, are such as I have practised extensively, and seen others do so with almost never-failing success; which resemble in a great measure the method of making hay in Middlesex, where the farmers can justly claim the merit of reducing the art of making good hay into a regular system,† and where they have long maintained the character of being the best haymakers in the kingdom.

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* Spreading, or tedding, as it is usually called, should never be performed, unless when the crop is very heavy, or when the swaths have lain some time in wet weather; but when it is performed from such causes, it should only be allowed to remain a few hours in fine weather in that state, and, at most, no longer than it can be put into grass cocks before the dew falls in the evening: for if permitted to remain some days in a tedded or spread out form, it becomes bleached and the juices too much exhaled.

STACKING HAY.

The form of making stacks being more a matter of taste than necessity, little is necessary to be said on the subject; only it must be obvious that small stacks must be better in a bad season than large ones, and that the former of a round shape are preferable when the quantity of hay is small, while the latter of a square or oblong shape are more suitable when the quantity of hay is large. Neat dressing of winter hay stacks, and securing them from rain,‡ seem to be more generally known and attended to than any other equally essential department of preserving the hay, while preparing it for such stacks; which no doubt ought very properly to claim the farmer's particular attention, otherwise all his former labour may be lost, at least as far as relates to quality. But it is certainly no more necessary to guard against hay being injured by the weather in one season more than another, as it can make no difference to the taste of cattle whether hay has been spoiled before or after stacking, and it must add much to the comfort of a farmer when bestowing the necessary labour of securing hay in the stack, if he has been successful in doing so before it was stacked. However, in some unfavourable seasons and situations, it is very difficult to get hay made in any shape so as to keep in a winter stack. In such cases, various methods have been resorted to, such as founding the stack upon wood, supported by pillars about two feet from the ground, and making air holes or chimneys* in the stacks, or in addition to these preservatives, or sometimes without them, a layer of straw† is alternately put with one of hay upon which salt is strewed.‡ But in those situations where such means are most necessary for preserving hay, the building upon wood and making of chimneys must more frequently prevail, straw being in such places generally scarce, and in some instances not to be had at all: however, in this case, the old hay formerly recommended to be in store will be found to be a good substitute, and should it be very dry and coarse, it will be much improved by the sweating produced by mixing of the new hay. In order to guard against the injury sustained from over-heating of stacks, which may or may not have been suspicious at the time of putting up, the practice recommended by the late Mr. Ducket occasionally being followed, until the stack may be conceived to be out of danger, would be the means of saving many a valuable one from being injured, if not entirely lost; which merely consists in thrusting a stout, long iron bolt into the stack, to give an easy admission to the ram-rod of a gun, furnished at the end with a strong worm, and by which means a sample is screwed out, and not only the heat but the colour of the hay is ascertained. Should the stack require air, it must be perforated in several parts in like manner, which will answer every purpose of a chimney or funnel. But when a stack is discovered to be in an advanced state of fermentation, it ought to be taken down by degrees.* After taking down one layer, allow the smoke to ascend from the next a little before it is removed, and so on until the whole is finished, when the hay, after being properly cooled, may be rebuilt.

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* When clover or fine hay is allowed to sweat in the barn or winter stack, it adheres so closely as to become mouldy, and loses its colour, and consequently its flavour; whereas these effects are prevented when allowed a gentle sweat in the summer ricks, as the exposure to the air in the act of removing it into the barn or winter stack will be sufficient to prevent any bad effects, particularly if the removal take place immediately after the sweating as it ought. And allowing coarse hay a gentle sweat in the winter stack or barn gives it a fine flavour, and softens the texture, from which the quality is not only improved, but the cattle's relish for it greatly increased.

† See Mr. Middleton's Corrected Report of the Agriculture of Middlesex, extracts of which on hay-making are inserted in the British Farmer's Cyclopædia, Complete Grazier, and Dickson's Agriculture.

‡ In order to secure a stack properly from rain, it ought to stand eight or ten days before it is thatched or topped out; which will prevent its shrinking afterwards.

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* Chimneys are commonly made by pulling a sack stuffed with hay up the centre from the bottom to the top of the stack as it is building.

† Mixing wheat straw with half decayed clover or after-math makes a very fine repast for cattle. I have by such means frequently turned large quantities of wheat straw to good account; in some instances, the second crop of hay or clover cannot be preserved as winter provender without such means.

‡ Mr. Young recommends one peck of salt to a load of hay. I am well aware of the good effect which salt has in preserving the hay and improving its quality; but how far it would be advisable to reduce such to practice upon a large scale, must, in a great measure, depend upon the price of salt and the intended purpose of the hay: but it is certainly highly commendable in situations where sheep are liable to the rot, so that it may be given as a preventive. (See Diseases, page 217.) Whenever there is the slightest cause for suspicion, salt may be administered to large flocks in this manner when it could not otherwise be given from the falling of snow, or various other causes.

From what has been now stated, the farmer or grazier must see the propriety of bestowing his utmost attention on all the various requisites, in order to secure a plentiful and nourishing supply of winter provender for his stock, which may in some cases thrive and do well when turned out to their own shift, and wholly left to themselves during summer; but let him not anticipate that such indolence and slothfulness are to succeed in winter. May I therefore conclude this chapter with the hope, that, although it has not afforded the grazier such information as he might have wished or expected, it will at least remind and stir him up to a sense of his duty.

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* By such means the burning of hay stacks will be completely prevented, which so frequently occurs from the current of air admitted so generally from a wish to cool the stack all at once by opening a large space in the centre.

CHAPTER VII.

ON THE IMPROVING OF PASTURE AND MEADOW LANDS.

THE subject of which this chapter is composed might properly have formed a part of the last, as the management of a grazing farm cannot be considered complete without a thorough knowledge (and proper application of it) of the best modes of improving such parts of it as will fully recompense the farmer for his trouble and expense; but as the improvements alluded to may be equally applied to a farm partly under tillage, it may consequently be more proper to allow the subject to form a chapter of itself, trusting that such does not in the least remove its connexion from the last one.

SECTION I.

IMPROVING PASTURE LANDS.

Pasture land is and may be improved in various ways, as circumstances may direct, either by the application of lime, marl, shell-sand, or a compost of lime and earth, &c. spread upon its surface, or by burning, paring and burning, folding with sheep, watering. But before having recourse to any of these methods, draining must be scientifically and effectually executed, otherwise such method of improvement will neither prove durable nor effectual.* The kinds of pasture land to be improved, more immediately under the present view, are extensive sheep or cattle walks, covered either principally with coarse grass or heath, enclosed pasture land, not of such a fertilizing quality as sufficiently to enrich itself by being repeatedly grazed upon, and pasture land covered with moss, rushes, &c. The most practicable plan of improving the first description of pastures here noticed, when coarse grass prevails most, is the application of new-slaked lime, in powder, early in summer, † allowing from six to seven single cart-loads, or thirty to forty bushels of shells to an acre, more or less, according to the nature of the soil.‡ Shell-sand, if attainable, may here be applied as a substitute, which, although it does not operate so quickly, § yet is equally effectual and of longer duration; but as an acre of land would require from twenty to thirty cart-loads of the best shell-sand, to be equal to the above quantity of lime, it therefore can only be employed as a substitute when it is contiguous to the pasture. But, in many situations, lime becomes too expensive for the improving of such extensive rough pastures, in which case watering and draining, either separately or collectively, as the situation may admit or require, will frequently prove sufficiently effectual, and is by far the cheapest mode of improving such land, when executed with judgment.|| But when the first description of pasture land, under present consideration, is principally covered with heath, and the application of lime, or shell-

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* See chapter on Draining.

† Lime in the above state, when applied to land in autumn or winter, is liable to be washed away by frequent rains, particularly on land with a declivity; or even when level it is too suddenly washed down beyond the roots of the herbage to have a proper effect.

‡ The quantity of lime allotted for an acre seems, in different countries, to vary as much as from one to six hundred Winchester bushels; in the event, therefore, of such various applications as to quantity being absolutely necessary to suit the variety of soil and climate, no precise quantity can be here condescended upon.

§ The effect of the best shell-sand is not visible until the third or fourth year, and even much longer when it is of an inferior quality.

|| See chapters on Draining and Irrigation.

sand,* as already stated, would not be practicable for the reasons likewise assigned, the burning system is then the only remedy; which proves highly beneficial to the pasture even the succeeding season. So sensible are some of the sheep farmers of its advantages, that they pay due attention yearly to the practice, and conceive it a loss of one fifth part of their rental, if, by any accident, they are disappointed for one season of getting it accomplished. Should the usual season for burning prove so wet as to prevent it, a general outcry then commences against the game act, which prohibits the burning of muir after the 10th of April. But as a little heath is of advantage, particularly where old sheep pasture, and in situations where such is the principal dependence during some of the severe months of winter; let the farmer, therefore, not be too eager in this pursuit, but burn the heath systematically, so as always to have a part of the farm covered with heath in its perfection,† for when too old, it becomes of little use, particularly that which grows upon a mossy soil; indeed, there is no necessity for keeping it old upon such a soil, as it will spring and be excellent food for sheep the following season after being burnt. But as the time of heath again covering the ground varies very materially, according to the nature of the soil,‡ the farmer or shepherd must ascertain that time from experience, or otherwise, and regulate his rotation of burning accordingly. The second kind of pastures which come under our present consideration are the poor enclosed ones, which may be much improved by the application of marl or lime compost,* spread upon the surface, about the end of autumn, or in winter, † allowing thirty to forty cart-loads per acre, more or less according to the strength of the marl or compost, and as the nature of the soil will bear or require.‡ The ground must be well bush-harrowed early in the spring.§ But such land is likewise much improved by grazing with sheep in summer, or folding them during winter, ‖ when fed with turnips, &c.; which, in all situations, proves of advantage, but more particularly upon light dry land. This system ought to claim the farmer's particular attention, where marl or compost is not to be had, or only upon extravagant terms, or in those situations where the carting of such heavy materials would not only cut up and injure the pasture, but destroy the horses, and interfere too much with other farming operations. But although such circumstances do call forth the farmer's attention to this system, yet I trust it will not be conceived unworthy of notice, even when the above articles can be easily applied and on moderate terms; for there are many situations where both modes of improvement can be resorted to with equal advantage. The spreading of water regularly over the surface is likewise another beneficial mode of improving such pastures,* and can frequently be applied, when neither of the above systems would be practicable, although no less valuable when they are so.

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* The application of lime or shell-sand is found very effectual in extirpating heath, but particularly the latter, which, in a few years, will completely eradicate it, and replace fine herbage.

† Mr. Hogg in his Shepherd's Guide, page 49, recommends one eighth of a sheep farm to be kept covered with heath.

‡ Mr. Hogg, whose practical experience in all the various departments of a sheep farm, must have qualified him in no small degree for being a sure guide to a shepherd, states, that where heather is extinguished by fire on a clay or loamy soil, it will not cover the ground again for twenty years; a hog-fence in twelve years; and if a gravelly soil, from six to ten years; but if mixed with moss, one half less; but when the soil is entirely moss, the heather will grow again the same year in which it is burnt; consequently he adds that the shepherd should, in the three former cases, keep a regular rotation of crops, and burn his ground in such a manner as to have always a proper proportion of it young, middle aged, and old. See Shepherd's Guide, page 50.

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* About one third of lime to two thirds of soil is a general proportion for compost, and a clay loam soil is mostly preferred; but any kind contrary to the land upon which it is to be applied will, in general, operate more powerfully, and answer best, and the thicker it is spread upon the ground the greater will be the improvement; only, when applied to grass land, care must be taken not to exclude the grass plants from air, otherwise the growth will be completely stopt.

† The above seasons are preferable, not only because they do not interfere with grazing in spring or summer, but that marl or compost is much improved from being exposed to frost, &c.; and rain washes it so completely into the roots of the grass that there is no obstruction to grazing in spring.

‡ Much injury has been frequently done from over-marling light sandy soils, but poor loose loams, and mossy soils, are not easily overdone with marl; in short, when the object is to give calcareous earth, the quantity of marl requisite is much less than when a consolidation of soil is the object.

§ Bush-harrowing is commonly performed by winding a few bushes of any description among the teeth of a common harrow: in some situations, such as stiff clay, the harrow will do without bushes; and in others, such as hard ground with short grass, turning the upper side of a harrow down will answer the purpose.

‖ The folding is usually performed by railing or netting off a portion of the ground, and there confining the sheep to eat turnips which are carted to them; and when the ground taken in is thought sufficiently manured, another fold is made. This system is likewise practised in summer, by folding the sheep all night; but in most cases it proves so injurious to the stock as ought to prevent its continuation.

The third kind of pasture land to be improved is that covered with moss, or fog and rushes, &c. Should the ground have only recently been covered in such a manner, the application of hot lime or compost,† as already described, will, in general, completely eradicate such obstructions to the growing of grass, and much improve its quantity and quality. But when rushes prevail most, the compost is preferable, and, previously to its being applied, they should be all cut close to the ground with a scythe, which allows the rain to enter into the stalk, and so penetrating into the roots, they will soon begin to rot and decay. However, when such land has been overrun with such nuisances for a considerable time, so that the roots of the moss or rushes have taken complete possession of the soil, and completely removed all appearance of any valuable grass plants, the best method of improvement is then to pare and burn;‡ which will most effectually disinherit the late encumberers of the ground, and prepare it for grass seeds, suitable to the soil and climate, which may be sown down, either with or without a grain crop, as may be judged most eligible.§

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* See chapter on Irrigation.

† The compost above alluded to should consist of lime and some kind of sharp substance, such as round sand, small gravel, or coal ashes.

‡ See Paring and Burning, chapter viii. sect. 2.

§ See chapter viii. sect. 2.

SECTION II.

IMPROVING MEADOW LAND.

Meadow land may be improved in a similar manner to that suggested in last section for pasture, and with most of the manures there recommended; but it is more frequently done by the application of thoroughly decayed dung, compost of lime and earth, spread with a good covering of either upon the surface, in the end of autumn, and harrowed well early in the spring. The roller will be of great advantage when the situation will admit or require it; indeed, in some situations it is quite indispensable, and its advantages numerous, from not only being the most effectual means of preparing the ground for the scythe, but upon such land as is apt to 'throw' or 'hove' in the spring, it causes some plants by its pressure to take root again, which would otherwise be lost. Firming of the grass roots by such rolling is a good preventive against its lodging in summer; and a great assistance to its recovery after being lodged. Irrigation, when it can be applied effectually, will raise most luxuriant crops. Land kept constantly under the scythe is not so apt to become fogged or covered with rushes; but immediately on the discovery of any part of it becoming so much só as the effects of a sharp compost will not remove, let such be pared and burned, and seeds harrowed in. This system may be applied to whole meadows if necessary, or will be found most effectual in preparing low grass lands covered with rushes, &c. for meadow. As repeated cutting of grass does, in every situation, less or more, impoverish land, it is therefore necessary to be using some means of enriching it, if not every successive season, at least every third or fourth one. By such attention, the quantity and quality of the hay will not only be kept up, but in many instances much improved; whereas, neglecting the application of the necessary fertilizing ingredients will quickly lessen the growth of the most valuable plants, and increase such intruders as means have been already advised to keep down and eradicate.

CHAPTER VIII.

IMPROVING WASTE LANDS.

What is here meant by waste lands, are such tracts or parts of fields as in their natural state are of little or no value. The first step toward the improving of any land is complete draining should it be found necessary, so as to clear it of all wetness that might have a tendency to injure its fertility when under a state of cultivation or when laid down in grass; and such land as is soft or boggy ought to be drained the year previous to any other attempt of improvement.

It is the erring in this particular that so much valuable manure and labour are lost, and the mode of improvement condemned; for in how many instances, may it be observed, that no sooner is the draining of a swamp finished, than immediate tillage and application of manure are set about, which nine times in ten fail in producing a crop worth reaping; consequently, either the attempt at improvement, or the land, or perhaps both, are condemned and abandoned; whereas a repetition of manure the following season would, in most cases, prove effectual. The next step towards improving such land is by tilling with the plough or spade, and the application of lime or dung; or by burning the sward or surface. But, previously to the commencement of any of these systems, the farmer ought to consider well which will be most effectual, and reimburse him best for the necessary trouble and expense to be incurred, or whether or not it would prove to his advantage to allow such land to remain in its natural state; for although the most of land will pay for judicious improving to a certain extent, yet some is to be met with, and which has been severely felt by too many from experience, that will never pay for improving even upon the most judicious and economical principles.* In order, therefore, to assist the farmer in condescending upon the most profitable plan of improving waste land, I shall first point out the ground most answerable for paring and burning, with the proper mode of executing it, and its advantages. Secondly, that which should come under the culture of the spade, with the various ways of performance, and its advantages. Thirdly, that which ought to be tilled by the plough, and the use of lime, with the various modes of execution, and advantages therein contained.

The first thing therefore proposed to be pointed out were the waste lands most suitable for paring and burning; but from its having been so long a matter of dispute, whether or not the practice is at all eligible in any situation, it may not be improper, first, to discuss the propriety or impropriety of pursuing such a practice.

SECTION I.

PROPRIETY OR IMPROPRIETY OF PARING AND BURNING.

Were I to quote the numerous opinions given by so many eminent agriculturists on this subject, supported by experiments, the majority of them would tend to convince a non-experienced person, that it would be proper to apply this system to all kinds of soil when covered with any kind of roughness, while others, by an equal degree of plausibility, and quotations of experiments, would convince him that paring and burning is quite an improper application, and that no soil is benefited by it, and that it might, upon some land, give a good crop for a few years, but that the depth of soil would be reduced and injured for ever after. But as experience has shown the bad effects of adhering too closely to the plausible reasoning on agricultural subjects, as likewise that going to extremes in most cases is dangerous, we shall here therefore take a general view of the causes of both the good and bad effects ultimately resulting from such treatment of land, which experience must have now clearly pointed out; and likewise show the unjust reasoning upon which the condemnation of paring and burning is so generally founded, and from which I trust such conclusions may be justly drawn as to dictate clearly the propriety or impropriety of such a practice, upon any particular situation. That judicious paring and burning, upon almost any soil, has produced good crops for a few years, must be generally admitted even by its enemies;* and further, that such crops have, in many instances, been repeatedly taken as long as they would continue to grow, upon this datum, that from the first crop being too strong, the next would be better, and so on;† and the land after being exhausted in this manner, has either been left to produce grass in that state, or by undergoing a very superficial mode of tillage and application of manure; consequently the result of such treatment has, as might have been expected, been, the land producing herbage of such a quantity and quality as neither to be enriched from its luxuriance,‡ nor from being able to maintain a sufficiency of any kind of stock to do so; consequently, on being again tilled for grain, the returns were not adequate to seed and labour. So much for the *cause* of bad effects; but the unjust reasoning immediately follows, by an adjacent field (of a similar quality, and having undergone the same course of tillage, and treatment in every respect, with the exception of being improved at first by a different process than burning) having been tolerable pasture and produced a good corn crop; hence the burning system has been conceived to be justly condemned from the inferiority of the pasture and the first corn crop after breaking up the second course; without the recollection that, by the burning system, during the first course of tillage, perhaps a third corn crop was taken, because the first two were too heavy; whilst, by the other system, a third corn crop was taken, from the first two having been too light.* By the above reasoning for condemnation, therefore, it must evidently follow that land which has given three successive luxuriant corn crops, requires only the same treatment as that which has given three successive light ones to make them produce again equal crops; consequently the one must exhaust land as little as the other, a doctrine which requires neither example nor reasoning to condemn, common sense being sufficient. But further, it may be observed that a great proportion of land which is pared and burned is such as is not contiguous or accessible to manure,† and that such a practice is not unfrequently resorted to upon such land merely to have a greater command of manure, in order to produce crops upon some exhausted in-field lands, which the burnt ground is cropped to the utmost extremity to support. But from the reduced state of the in-field land, and the trouble and expense of carting manure to the land formerly burnt, to bring the latter under a course of green crop, with the application of manure, seems to be entirely out of the question; and if such land does not, upon merely dismissing the plough, produce grass for a few years, and, when again turned to tillage, one or two corn crops equal to those raised from lands that have not been burned,* placed in a more warm and sheltered situation, but formerly reduced in a similar manner by over-cropping, the burning system is here again condemned; the unjustness of which, in this case, proceeds from not taking into account, that land, in a warm sheltered situation, will, although ever so much reduced by cropping, if pastured a few years, gain such a covering of grass, as will enrich it so as to give one or two tolerable corn crops; whereas, land in a cold exposed situation, not having the same advantages of the natural fertilizing qualities of the sun to increase the pasture so as to enrich it, requires the administration of some artificial fertilizer to do so, otherwise it will either remain for ages in a naked state, or produce such plants as will rather tend to diminish than increase the quality of the soil. Although this doctrine may not be so clearly decided by common sense as I conceived the last to be, yet it is sufficiently demonstrated upon all mountains lying in a natural state; upon examining the difference of the quality of soil and herbage, upon such parts as are exposed to the sun, from such as are completely sheltered from it. But the *cause* of bad effects resulting from paring and burning, as likewise the unjustness of its condemnation, also proceeds from an improper application and execution of it. With respect to the former, it may be observed, that, in almost every instance where this system has not succeeded, after being properly executed and any thing like good husbandry pursued upon the lands afterwards, it has been invariably upon some thin light

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* The description of land above alluded to is such as may be in a stagnated state with water, and which cannot be removed at any expense which the nature of the situation or soil is at all likely to pay for; or barren tracts of muir producing weak and sickly plants of such as are natural to it, and there being no subsoil susceptible of improvement by exposure to the atmosphere; or such woody, rocky, or uneven ground as the interest of money expended upon clearing, or levelling alone, would be an adequate rent for it when in the highest state of cultivation. Let the farmer leave such place for the improvement of the proprietor, and, unless it is to gratify taste, he had better turn it into ponds or plantations.

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* In most cases where paring and burning has failed in producing a good crop the first year, it has proceeded from its not being properly executed either from want of knowledge or season suitable.

† Such scourging is generally pursued by the enemies to the burning system.

‡ It may be observed that land, once covered with herbage of a good quality, and not allowed to run to seed, will gradually improve by lying in that state, even although not pastured with stock at all.

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* It has been a common custom among such farmers as adhere to no proper rotation of cropping, that, in breaking up a field wherein they have apprehended that all manner of justice was bestowed, on the first crop misgiving, it was either attributed to the unfavourableness of the season, time of sowing, or the improvement not having had time to operate: such imagination, and with a view of compelling the land to pay for what has been done to it, has been the frequent cause of even a third corn crop being taken.

† Hence arises one of the principal advantages resulting from the burning system. See the following section.

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* Such land as is of easy access and well sheltered, is generally improved by ploughing and the application of manure, while the more elevated and exposed parts are reclaimed by paring and burning.

land, or such as has, at the time of burning, produced white ashes of a light and useless description;[*] and as to the latter, it must certainly not have escaped the land-burner's notice, that, on burning clay land, it has frequently happened, that a kind of brick or hard substance has been produced instead of ashes, arising partly from burning with too clear a fire, and partly from the nature of the clay. But has he not likewise observed, that when burning light soil, whether from accident or otherwise, some parts of the ground would burn until it reached a subsoil of till, sand, or gravel, and that upon such places no kind of seed would vegetate, when perhaps a tolerable or good crop was surrounding them upon the same soil which had not been so severely burnt? Such remarks I have had so repeatedly and clearly demonstrated in the course of my experience,[†] that I apprehend they must have been equally so to all who have had the good or bad fortune to be embarked in the business to any extent. But I shall now proceed to show the causes of the good effects resulting from the application of fire to the soil;[‡] which may be summed up in a few words, viz. attention to the kind of soil which ought to be burnt, and depth of paring requisite for it; attention to the mode of burning, and all other particulars necessary for completing the process;[§] and lastly, due attention to a proper mode of tillage afterwards. In therefore drawing such conclusions from the causes already given of the different effects of paring and burning land, so as to decide upon the propriety or impropriety of such a practice, it may first be observed, that although I have admitted that such a system does occasionally misgive from various causes, and in which every candid observer must agree with me, yet I trust that he will likewise acquiesce with me in saying, that, while such a system ultimately misgives *once* by misapplying or not understanding the process, it does so *twice* by the usual improper treatment of the land afterwards; and I am persuaded that if the following rotation of tillage were more strictly adhered to, there would be less reason for complaint. First take a crop of turnips or rape eaten upon the ground with sheep, * after which sow grass seeds either with barley or oats, or without them; then pasture with sheep such a number of years as the nature of the soil and situation may best dictate; and if broken up again in two or three years, take one crop of oats, the straw of which being converted into manure, and applied to the same ground, preparatory to another green crop. The pursuing of such a mode of culture will not only keep the land in a high state of condition, but will be the means of speedily more than regaining the supposed lost soil from paring and burning. Whether or not burning does diminish the soil, has been long a matter of keen dispute; and should the different writers on the subject not have clearly defined the point, they have at least afforded a sufficiency of amusement from their discussions. It is, however, in this very particular, that the grand secret seems to rest; for the enemies to the system mostly admit that it does produce good crops at first, but that the soil is so much reduced by it that it is good for nothing ever afterwards. From what has now been stated on the subject it may be observed, that although I am an advocate for burning in many situations, yet I greatly disapprove of it in others; and likewise, that although I admit that it does in some degree reduce the soil at first, yet I am equally willing to believe, that when land receives any thing like the justice above recommended, the decrease of soil will be fully returned, and the quality much improved; for if this was not the case, but that burning reduced soil in the alleged degree which has been set forth by so many speculative chemists and theorists, the soil in many of the districts in England would have been long ere now quite invisible; whereas, in such districts where the practice of paring and burning has been kept up on the same land for centuries, every eight or ten years according to the formation of the sward, on such lands nothing like a decrease of soil appears.*

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[*] Although the above may not be generally observed, yet it must have been felt by many from experience, which I have done upon the above description of land, in such a manner as not to be able to raise one crop equal to seed and labour.

[†] Some years ago, I improved land to a great extent by paring and burning various soils, and by various methods, and being a constant superintendent, I thereby witnessed the effects of different experiments; indeed, so zealous was I in the cause, that in order to keep the firemen to their duty, I have repeatedly gone among them all night.

[‡] The above seems to be of long standing, being recorded by Virgil and other ancient writers to be a sure means of improvement.

[§] See the following section.

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* All light loose soils, in whatever manner they are broken up from a state of nature, ought, invariably, first to be under green crop eaten off with sheep: this not only enriches the land beyond any other measure yet adopted, but the sheep give such ground that firmness so essential after its being tilled. Rape or cole seed is preferable to turnips, when the ground is wet, or late in the season before it is prepared.

But before dismissing this subject, it might be satisfactory to quote such instances as will tend to prove that, although the depth of soil in the first instance may be lessened by burning, yet such is again resumed and kept up by the effects of good management, or the benefits of a good climate. For example, take a moss, the sward or turf of which being mostly reduced by burning, but that in some parts the soil is less or more consumed to ashes along with the surface vegetable particles, it may therefore be observed, that the crop will be most deficient upon such places as the fire has penetrated farthest. For instance, allow a piece of mossy land about four inches deep, with a hard till or rocky bottom, to be pared and burned to its full depth, and completely consumed to ashes,—may a crop be expected from such treatment? Certainly not; for, as I have already stated, frequent instances must have occurred to a practical land-burner to convince him, that the soil of light mossy land half burned will answer every reasonable expectation, while such parts of it as happen from chance or otherwise to be completely reduced to ashes, will never produce a crop of any kind without the application of some soil. If therefore such treatment has not the effect of reducing the quantity of soil, it must evidently appear to completely destroy the quality of it; consequently some kind of land can be injured from injudicious paring and burning. It is however generally admitted, that paring and burning, even in a judicious manner, reduces a mossy soil most; yet the fens of Cambridgeshire are a striking proof that such is fully restored by a few years' pasturage;* which must either proceed from the state in which the land is laid down, or the fertility of the climate producing a covering of grass, which will of itself enrich and deepen soil, if kept from running to seed.† From the few remarks now stated relative to the paring and burning of land, it must evidently appear, that the propriety of pursuing such a practice must consist in having land suitable, having a proper knowledge of the system, and adhering strictly to a good system of tillage or grazing thereafter; while the impropriety of following such a practice must consequently rest upon the reverse of the above recommendations for pursuing it. But allowing that my reader is not from practice enabled to distinguish the land most suitable for paring and burning, and the proper mode of executing it,‡ I trust that the remarks in the following section will render some assistance, being founded upon a long and extensive experience.

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* See Annals of Agriculture, vol. xxviii.

SECTION II.

LAND MOST SUITABLE FOR PARING AND BURNING, THE METHOD OF EXECUTING IT, AND ITS ADVANTAGES.

All ground covered with a thick matted sward may be less or more improved by this system; for if such a sward alone, even upon that kind of light land already disapproved of for burning, were only pared and burned, it would afford some ashes, and be found to be the most expeditious and effectual means of reducing such vegetable substance to action. Any soil producing ashes of a superior quality,* so as to give the ground a fair covering, and leave as much of the soil unburned as will admit the plough a proper depth without turning up injurious subsoil, will likewise be much improved by burning; in short, it is practicable upon all deep heavy soils, (which invariably produce the best ashes,) unless upon some clay land where fire has more the effect of reducing it to a hard substance than to ashes: and it is only practicable upon thin light land, when the subsoil, from being exposed to the atmosphere, will become equal if not superior to the soil; in this case I have seen the best effects result from the practice even when the soil was totally converted into ashes. The description of land least benefited by burning, is that where the soil is composed of as much strong clay as to prevent its being reduced properly to ashes, but is more apt to run together and form hard substances like bricks; and such land as produces white light ashes. These lands should not be burnt unless the design is to benefit them by something else than the effects of ashes, such as burning the former, to remove the tenacity of the soil, (being generally its greatest evil,) or the roots of injurious plants, such as rushes, &c.; and the latter, to remove all the rough herbage from the surface, and extirpate the roots of heath, rushes, &c. The above circumstances, although so trifling in some instances as not to defray the expense of paring and burning, yet in others will be of such consequence as to render the burning quite indispensable.

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* In the fens of Cambridgeshire, paring and burning has been repeated once in eight years for upwards of a century and a half.

† See note ‡ page 345.

‡ If the intended land-improver, by the burning system, has not acquired some knowledge of it by his own practice, or from a minute observation of that of others, he had better hear both sides of the question, or what each practical man has to say on the subject, and then decide upon what he conceives to be the most likely mode for success: he ought, however, then only to commence upon a small scale, for men being all less or more blind to their own imperfections, will consequently approve or disapprove of such a practice, according as they may have benefited by it, without being able to discover any defect in their part, although perhaps sufficient to debar all good effects from resulting from the system.

Method of Paring and Burning.—To execute this work properly, the mode must be varied according to the nature of the surface, soil, and season. The first consideration, after examining properly the surface, is, whether it will be most advantageous to pare with the breast or horse-paring ploughs.[*] Should the surface be very rough, uneven, or any stones, roots, &c. be below it, the former ought to be preferred; but when such encumbrances do not exist, the latter should have the preference, the expense being much less.[†] The next thing to be observed is the proper thickness and breadth of paring, the former being commonly from one to two inches, and the latter from nine to twelve, less or more, according to the nature of the soil and sward. Light land, and such clay land as is apt to form a kind of brick, must be much thinner than that of a deep soil all of one description; for in the latter case, the thicker the paring the better, as the more ashes the greater the improvement; but in the former, if light land, it may be overdone,[‡] and if clay, a thick sward will seldom be able to be consumed. It must however appear quite obvious, that, in order to facilitate the work, and even in many situations to get it executed at all, land should be pared much thinner in a wet climate than in a dry one, or when a short time is allowed to sow the intended crop in due season. During the time that the paring is going on, some people must be employed in setting up the parings to dry;[§] and if the work has been done with the horse plough, some men must be cutting the parings[||] into such lengths, as they will stand when put up two or three together, while women or boys are setting them up. One cutter is generally allowed to two setters up. When the parings are become dry enough to be burned, the operation may then be commenced, on the proper executing of which the good or bad success of the system greatly depends; for it must be remembered, (and must certainly be well known to all who have had the least experience in burning,) that ashes produced from a quick and large body of fire are far inferior to those made by a slow smothering one, and that the more heaps that are burned upon stiff clay and deep mossy land the better,* while the contrary has the best effect upon light loose land.† Therefore, in burning the one kind of land, a number of fires should be commenced, leaving as much of the parings around each as when they are all applied to these respective fires, that the heat of one may communicate with that of another; while in burning the other, fires ought to be placed at great distances, and the turf carried to them as the state of the fire may require: but where there are large fires, there will be more heat, and, consequently, the moisture will be absorbed to a great distance around each: this, however, must be prevented from confining the heat as much as possible, by applying fresh turf always as the heat or flames seem to break out, which is the kind of smothering fire that produces the best ashes. It is therefore necessary, not only in this case, but in all others where the operation is going on, that all the fires should be covered up at night so as to keep in the flames until the morning, when a fresh supply of turf must be given, and so on until the work is finished. But in some moist climates or seasons, adhering closely to such particulars is out of the question; the object then is to get ashes made in the most expeditious manner; and, in order to accomplish this, a great body of heat must be kept up, which can only be done by large fires: but in such situations and seasons, great attention and constant attendance are requisite, otherwise the work will be executed in a very superficial manner, if at all. In commencing, therefore, let a good quantity of the roughest and driest of the turf be collected and made into a fire, and increased with such dry turfs until a great body of heat is raised, when a covering of the parings may be added, taking them just as they lie; and as this covering begins to be at its height of burning, apply another, and so on: but in this case such a covering can seldom be given at night, so as to keep the fire until the morning in such a state as it will consume wet or damp turfs; for if only a few of such parings are applied, they will be almost quite consumed before the morning, and if such a covering of them is given as to prevent this, it will in all probability extinguish the fire altogether, or merely burn the roughness from off the turfs, which will leave them in a state doubly more difficult to be consumed than if they had never been upon the fire at all. Therefore, to accomplish burning to perfection when the parings cannot be got completely dry nor the weather to be depended upon, two sets of burners must be employed, one by night and the other by day; which will prove to be most effectual, expeditious, and cheapest in the end. But there is another method of burning, when it can be accomplished, which is executed with much less trouble and expense, and which proves upon some light land the most effectual, viz. when the surface is all covered regularly with some rough sward, it must be ploughed in such a manner as that each furrow may stand almost erect or rest very gently one upon another, which the roughness will render easy to be accomplished. In this manner the furrows will soon become dry, when fires must be kindled at about thirty yards distance from each other, and as soon as they appear to be in one mass of live coal, let each be carried with shovels and dispersed among the furrows at every eight or ten yards distance. If the furrows are quite dry, and thinly pared, they will very soon be wholly converted into ashes; but, if they are thick pared, dry on the outside, and damp in the middle, they will become, by the above process, half burned; which experience upon a very limited scale will soon prove to be the best mode of burning light soils. This method, however, should only be attempted when the one or other can be fully accomplished.[*] When the burning is completed, the ashes should be spread regularly over the ground, even although it is not immediately to be sown with any kind of seed, as they will receive benefit, rather than injury, by being a little exposed to the atmosphere; and when the ground is to be ploughed for a crop, it ought to be done with narrow thin furrows: ashes, having the same tendency to go downward as lime, should therefore be kept as near the surface as possible. If the land is light, a green crop should invariably be commenced with, and eaten upon the ground with sheep.[†] The season for commencing burning is generally in March, but must vary according to the state of the soil and weather, or other circumstances;[‡] and should land be pared in the autumn or winter, so as to be in readiness in the spring, it ought all to be set up as already mentioned, and kept in that state, as it will be much sooner ready for burning than if allowed to lie in the furrow all winter. To conclude; the particular advantages of paring and burning are, the expeditious manner in which a rough barren waste can be covered with a fine luxuriant green herbage—the saving of expense, when compared with other modes of improvement, to make them equally efficacious—the incalculable advantage of being applicable to situations where no other system could

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* Such as those produced from a clay loam, black peat, or any other earthy substance.

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[*] The breast-plough, or breast-spade, so called in various parts of England, but better known as the flaughter-spade in Scotland, is now so well known as to require no description of it. The paring horse-plough is variously constructed, but differs principally from the common plough in the breadth and sharpness of the sock, which has generally an edge turned up a few inches, similar to that upon a flaughter-spade.

[†] No stated price can be here given, as such must vary according to the nature of the surface, the method in which it is executed, and the price of labour where it is performed; but in such land as has no obstruction to the flaughter-spade, paring with it may be estimated at twenty shillings per acre, burning in heaps at ten shillings, and spreading the ashes at three shillings per acre; and paring with the plough may be calculated at the one half, when it can work without interruption.

[‡] See page 350.

[§] They ought to be set up so as to rest against each other at top, while the ends upon the ground should be spread so as to admit of air: three pieces will stand better than two.

[||] The above is sometimes done by cross-ploughing with a very sharp coulter either before or after it has been pared: when the former, the coulter is fixed so as merely to rut the ground by being placed some inches below the level of the sock, which runs upon the surface.

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* Upon stiff clay land, the heat opens that part of the stratum of clay next the soil, so as to allow the roots of vegetables to penetrate and derive nourishment. And upon deep mossy land, the heat absorbs the superfluous moisture, and thereby firms it; therefore, the more that heat is dispersed over such lands by a number of fires the better; the benefit of which I have repeatedly proved, by removing one half of the ashes burnt upon one part to such ground as had not been burnt at all, and found that plants grew more luxuriantly upon the parts that were burnt.

† Light land seldom has too much moisture; therefore, when fire is distributed over such, it absorbs that which ought rather to be increased.

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[*] If the furrows are not sufficiently dry, and the weather not steady and settled, it is dangerous to attempt to burn as above described; for, by adding live coal to the furrows, it may merely burn away the roughness, which will very much retard the operation, if recourse is obliged to be had to burning by heaps.

[†] See note page 349.

[‡] In situations where there is much rain in winter, summer is the best season for burning, as the ground is much drier than it can be expected to be in spring, after so much rain; and when it is burned too late in summer, to admit of a green crop, it ought to be ploughed thin before the winter, and kept dry during that season, and reploughed in spring for a crop.

properly be adopted, either from the heavy expense of manuring, or from the total want of it; in short, paring and burning is a system which will improve the most of soils, and absolutely necessary in doing so to others; and when judiciously applied, it must evidently appear to every one with his eyes open, to be one of the best modes of bringing in uncultivated land, or improving such as has been cultivated, but which has been so long under grass as to be covered with a tough matted sward. If such an opinion is not yet general, I trust that an extension of the flames will speedily enlighten such corners of the earth as may still be in darkness.

SECTION III.

LANDS MOST SUITABLE FOR THE CULTURE OF THE SPADE, METHOD OF PERFORMING IT, AND ITS ADVANTAGES.

The land most suitable for spade culture is such as has a rough and uneven surface, or large stones and roots underneath it, so as to impede the progress or perfection of the plough, or such as is of so soft a nature as either to be much injured by the trampling of horses, or not able to carry them. There is, however, land where the plough might work with great ease, and seemingly to great perfection, where the spade would be infinitely superior, viz. where a valuable subsoil is underneath a soil which should be replaced with it, and is beyond the reach of the plough.

Method.—When the land to be improved possesses the above obstructions of the plough, it will generally be necessary to trench the ground, in order to remove them; but when the surface is only uneven, and such obstructions not deep in the ground, levelling and delving one spade deep will frequently be sufficient, unless it should be practicable to go a little deeper, in order to improve the soil.* When trenching such land, however, is necessary, it is in most cases advisable to keep the uppermost earth always so, being in general of the best quality, and more fertile for the growth of any crop.* Therefore, in opening the first trench, the earth must all be cleared out, and laid to a side, keeping the soil separate from the subsoil; and the top soil of the second trench must likewise be laid to a side, when the subsoil may be turned into the bottom of the first trench, and the top soil of the third trench thrown above it, with the green side down; and so on, until all the ground is trenched, which will leave at last an empty trench and a half, which, by carting to it the first earth laid aside, will complete the work. By this method the good soil is all kept uppermost, and there is always a clear trench, so essential when large stones or tree roots are to be removed. The preparatory step for a crop upon such land as is either delved or trenched, is generally either manuring for potatoes, or liming for broad-cast turnips or oats. If the former, the manure should be put on while delving or trenching, immediately below the top sward turned down, the potatoes being either planted above the manure, and covered with the sward, or dibbled in afterwards; but, if either of the latter crops is intended, the lime or compost may be harrowed in with the seed. When land is of such a soft nature as to render the spade culture necessary, it may be delved or trenched, manured and planted, or sown, as already described, just as the nature and situation of the land may dictate; or it may first be improved, or afterwards cultivated by the old method of lazy beds:† but lands of this description being of a mossy nature, paring with the spade and burning should almost invariably be preferred. As it is necessary, however, in such wet land, to throw it into ridges with deep furrows cut on each side, great care must be taken not to make the ridges too narrow or raised in the centre, as such land does not answer to be dried rapidly, or too much. But when land is of such a description, that it would be advisable to place the subsoil uppermost, it may be done in the too common method of trenching; and, in order to fertilize the land, and insure a crop in the most expeditious manner, the trenching should be finished some time before the winter, limed on the surface and rib or break-furred, in which state it must remain during winter. Cross-plough early in the spring, and drill for green crop with manure. This will expose the soil in the best manner to the atmosphere, so beneficial and necessary when it has been trenched in the above manner. The advantages attending the spade culture are, the proper mixing and deepening of soil, the removing of nuisances, the replacing of bad soil with good, its facility of drying land by some of the modes already mentioned, and producing crops where they could not otherwise be attempted or effected.* To here insert any thing approaching to an average expense of delving or trenching, would be vague and useless, as such must vary very considerably, owing to the method in which the work is executed, the nature of the soil and nuisances to be removed. Delving varies from two to five pounds per acre, and trenching from five to ten pounds per acre.

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* Soil is sometimes much improved and deepened by a mixture of the subsoil, as likewise by loosening a stiff subsoil, so that the superfluous moisture may be more quickly and effectually absorbed.

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* The expectations and good effects of trenching are too frequently buried in the trench, by placing the top earth (which has been fertilized for ages by the decay of vegetables, &c.) below such as will take years to make it equally fertile even with the aid of manure. And how common is it, after such treatment, when the farmer's hopes are not realized the first year, (which is almost invariably the case,) that he gets disgusted at his improvement, and allows the land to be trampled with cattle, and remain with stagnated water, so that it is much worse than before.

† Although the above method of improving or cultivating land is now generally well known, particularly in Ireland, and in various parts of the Highlands of Scotland, yet it is executed in various ways; but the following I have found to answer every expectation that might be expected from the system, viz. first line off ridges on the surface, (by making ruts with the spade) from four to six feet broad, leaving a space half their breadth between each; spread the manure upon the sward of the ridges, and plant the potatoes above it, covering them slightly from the spaces left between the ridges; the top sward of each vacant space must be pared rather thin, and laid upon each side

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of the ridges adjoining, with the green side down, being cut a little with the spade. After it is laid down, the centre of the ridge is covered with earth, and the work is so far finished; but when the potatoes are beginning to spring, a slight covering may again be given them from the empty spaces, and always as they advance in length, add a little more fresh earth to their roots, until the tops begin to meet.

* Such as wet boggy land, and elevated rocky places not accessible by the plough, which are quite familiar to many a Highlander.

SECTION IV.

LANDS WHICH OUGHT TO BE IMPROVED BY THE PLOUGH, METHODS OF EXECUTING, AND ADVANTAGES CONNECTED.

Having already pointed out such land as ought to be improved by paring and burning, and the culture of the spade; therefore such as has not been noticed or disapproved of for the burning system, must necessarily fall to the lot of the plough. But to be more minute; such land as I conceive ought to be improved by the plough alone, is that which consists of a thin light soil, which, by burning its sward, would not (either from a deficiency of quantity or quality of ashes) be sufficient to raise even half a crop of turnips; or where a large tract of land is intended to be improved by cultivation, and so situated, either from a deficiency of workers to execute the burning system, or from the moistness of the climate, that such an extent could not be improved annually as might be wished for.

Method of performing the work.—It is common in some places, when improving land by the plough and the use of lime, to plough it some time in autumn or winter, and then spread the lime upon its surface, allowing it so to remain during next summer, and perhaps the following winter, just as the sward may require to be fully rotted. And after cross-ploughing, harrowing, and ridging up, it is too common to take a crop of oats by way of paying for the lime, and making up for such a long time lost.[*] In other parts, however, after having ploughed and limed the surface in autumn or winter, the farmers give it a fallow in the spring, and, by the application of a little manure, put in a green crop some time in summer. Both of these systems have their advantages when properly applied; for if the soil is light, and the sward a strong heath, or something similar, it certainly will be benefited most by the first method, as such a sward will require a long time to be properly decayed, which must be greatly facilitated by allowing it to remain excluded from air. But if the soil is of a stiff or clayey nature, and but lightly covered with any kind of roughness, the latter method must evidently be superior, as the decay of such a sward is of little consequence, while the frequent turning up of the soil is of the greatest, and will bring such land into a state of fertility in the quickest and most effectual manner. But the description of land more immediately under our present review, to be improved by this mode of culture, is a muir with most frequently a thick matted turf of heath and coarse grasses; and it has been found from experience that lime does not only consume the roots of such vegetables, but that it converts them into a valuable manure, and that the less they are exposed to air the quicker will be the effect. It is likewise found by experience that such a sward generally requires at least twelve months to consume it properly. The following mode must therefore evidently appear to be superior to the others, not only in facilitating the proper consumption of such a sward, but in insuring more speedy and luxuriant crops afterwards; viz. suppose a certain quantity of lime to be allowed to the land, first spread one half of it (in a hot powder state) upon the surface before it is ploughed, and the other half after, by which means the furrows and the whole tops and roots of plants are completely surrounded with the caustic ingredient; consequently the whole will sooner be brought to a state of putrefaction. The land having lain in this state all winter, it must be harrowed in the spring, which will exclude the air from the plants or sward, and after remaining in this state during summer and the following winter, it must, in spring, be cross-ploughed, harrowed, &c. until sufficiently pulverized for the growth of turnips; tolerable crops of which have been raised without any further manure, but in proportion as it is given may the return be expected. Due attention being paid to the various modes recommended in the preceding pages of improving waste lands, will, if properly applied, I trust, prove successful in bringing tracts of waste land to a state of usefulness. This however will operate in a greater or lesser degree, according to the treatment which such land receives after it has been thoroughly prepared for such a state; which leads me to a discussion of the proper manner in which improved waste lands ought to be laid down for permanent pasture or meadow; for it is in general more particularly in this than in a continued course of tillage that such lands prove ultimately useful.

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[*] Although the above is common, yet the more enlightened agriculturist takes a green crop and waits more patiently for the payment of his lime and labour, and he is in general amply rewarded for his patience.

SECTION V.

SOWING WITH GRASS SEEDS FOR PASTURE OR MEADOW.

Having condescended upon the future intention of the land to be sown with grass seeds,* the further procedure must necessarily vary accordingly. Permanent grass lands ought to be laid down with natural grasses, either with or without a corn crop,† and those intended to be occasionally under a course of tillage with artificial grasses. But as I cannot here enter into a very minute discussion of the proper application of all the different kinds of grasses to their various soils and situations, those therefore who may be desirous of such interesting and valuable information, will find it most minutely and ably discussed in the different treatises mentioned below,‡ where quotations from all the most eminent writers on the subject are inserted. It is of the greatest importance for the farmer to become thoroughly acquainted with the kind of seeds he is sowing, and such as are best adapted to a particular soil or situation,§ in which he may be greatly assisted by consulting the authors already referred to. But as it is almost impossible to give general rules for the application of seeds best adapted to all the varieties of soil and climate, a little practice, therefore, with a strict observation of the kind of useful grasses which seem to grow naturally upon land, will ultimately be the surest guide as to the kinds which ought to be most cultivated. The proportion of seeds suitable per acre must likewise vary so much, owing to soil, situation, nature of the plant,* and future intended purposes, as to make it difficult to condescend upon exact quantities. The following will, however, in general hold good, that without a sufficiency of seed a good crop cannot be expected, and that it is therefore best to err on the safe side, by giving at least plenty of seed;† that land intended for hay does not require so much seed as that intended for pasture; and that wet, cold, or exposed land requires more than that which is dry, warm, and sheltered. I shall, however, here insert the most common practice of sowing down land, without holding it out as a just criterion. Upon such lands, therefore, as are intended for one crop of hay, from one to one and a half Winchester bushel of annual ryegrass and ten to fourteen pounds of red clover per acre are sown; but if one or two years' pasture is to follow, such quantities are a little diminished, perennial ryegrass substituted for the annual, and the following added; white and yellow clover of each from four to five pounds, and sometimes from three to four pounds of ribgrass. For such lands as are intended for permanent pasture, if dry, from one to two bushels of what is termed common grass seed, such as is procured from natural hay, white and yellow clover from eight to ten pounds, with nearly an equal quantity of rib-grass; but if such land is damp or wet, the clover is frequently omitted and a quantity of goose grass added. I have repeatedly had from such treatment the best of hay and pasture: however I am sorry to add that it is a too common practice, particularly in some parts of Scotland, when land lies low and damp, to sow it with the sweepings of hay-lofts without paying the least attention to the kind of seed, which is done with the view of raising a good crop of natural meadow hay; but such a practice of late has been much laid aside by the more enlightened agriculturist, and replaced by that of sowing clean seeds of the best natural meadow grasses.* In sowing down mossy land, or such as is liable to be injured with the grazing of cattle, the meadow foxtail and smooth staked poa grasses are worthy of notice, from the firmness which their roots give to such land. But although the benefits resulting from a strict attention to the most suitable kind of grass seeds are great, yet they are more so in raising a crop of hay than when land is intended for pasture alone; for when a mistake occurs in the latter case, it will soon rectify itself by the growth of grasses most natural to the soil, which will soon predominate over such as may have no claim to the situation. It may likewise be observed the effect which the method of pasturing has upon pastures; for if the finest sweet herbage is allowed to grow for a year or two, and not kept down by grazing, it will become strong and coarse; and if coarse herbage is eaten close down for a few years, it will improve much in quality, particularly if grazed with sheep. However, when a proper judgment in pasturing † and a thorough knowledge of the plants most suitable for the situation are combined, the farmer will arrive much sooner and more effectually at his purpose.

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* See chapter on the Management of Grazing Farms, page 290.

† Thin loose soils ought to be sown down for permanent pasture without a corn crop, as the superiority of the pasture will soon repay the supposed loss of the corn crop.

‡ Pott's Cyclopædia; Dickson's Agriculture, vol. i.; Forsyth's Agriculture, vol. i.; Complete Grazier, and Dickson's Grammar of Agriculture.

§ How common is it from inattention to the above, for a farmer to be sowing, with much pleasure, the seeds of plants which he has been at great trouble and expense to eradicate, perhaps from the very same field; and likewise sowing such seeds upon dry land as will thrive best on moist, and on wet land those which will thrive only on dry.

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* Plants which produce numerous stems from the same root or seed require to be thinner than such as produce fewer or only one stem.

† It may be worthy of remark, that where one crop is injured from too much seed, ten are so for want of it.

Having now stated such modes of improving waste lands as have come under my notice, partly from observation, but mostly from practice, I trust that although the application and method of executing them may not be entirely new to most of my readers, yet some of them may at least prove useful. But it must be kept in mind that while one attempt in making such improvements fails, from a want of knowledge in the proper method of executing it, two do so by injudicious management after the work has been properly executed. The 'key-stone,' therefore, to all such improvements, is the pursuing of a proper course of tillage after the land has been prepared for it; and if such is not skilfully and attentively adhered to, all the farmer's former assiduous labour will seldom if ever meet with an ample reward. It ought therefore to be observed that however successful the use of lime, and ashes produced from burning, either individually or collectively, may prove in raising a few good crops from a new soil, yet those stimulating manures cannot be relied upon for a continuance of such. The object then ought to be, how to get a command in the readiest manner of such manure as will keep the land in a permanent state of fertility; for which, in most cases, that system of management already recommended as a prevention of the general cause of complaint against paring and burning will be found very suitable.* This rotation alluded to will keep the land continually in a high state of cultivation, which is the most certain way of reaping the utmost advantage from any soil or system of improvement. Should land, improved by any of the methods noticed, be so situated, or of such a description as evidently to be best adapted for permanent grazing, and if after the first crop of turnips or rape the ground appears not to be sufficiently broken or pulverized, it should not then be sown down with grass seeds until after the second green crop; which ought immediately to succeed the first, provided the soil is poor or thin. These successive green crops being both eaten upon the ground with sheep, and the land sown down with grass seeds without a corn crop, will put it in such a state as to afford yearly satisfaction afterwards, otherwise no other kind of management will. It is only by the strictest attention to these and all the preceding various particulars that a permanent support of the purse need be expected from the reclaiming of waste lands; and before such undertakings, particularly when upon a large scale, are commenced, the improver should endeavour to discover whether he is possessed of a sufficiency of perseverance to accomplish the work; patience to wait the ultimate return of it, and a capital to support both: for without these combined qualifications, it is much to be feared that he will be too ready to exclaim "that all is vanity."

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* Meadow foxtail, fescues and poas, sweet-scented vernal, &c.

† See Management of Grazing Farms.

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* See page 349.

CHAPTER IX.

DRAINING LAND.

SECTION I.

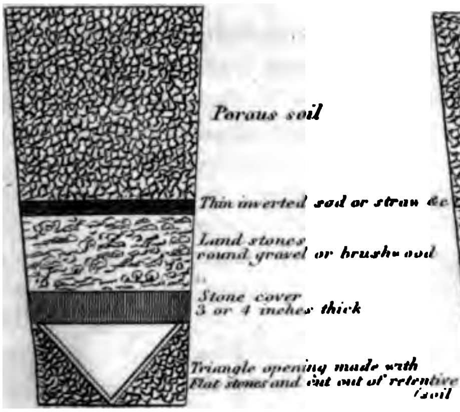
INTRODUCTORY REMARKS.

From having already swollen this volume much beyond the original intention, my remarks in this and the subsequent chapter must be more limited than what I could have wished, or at first proposed; but, indeed, to those who may have studied the numerous valuable essays on the subject of draining land, which have already been laid before the public, (but more particularly Mr. Johnstone's treatise,) what I am now going to state, and what I might have stated, provided I had fully exhausted my ideas on the subject, would prove to them of little service. My present remarks on this subject, therefore, are more particularly intended to be useful to a class of men who may not have access to such writings, and wherein too much theory or extravagant modes may be contained for the limits of their situations to reduce to practice. I shall therefore proceed to give such a description of various modes of draining land as may be comprehended by the weakest capacity, and which modes have been practised with the utmost satisfaction, and may with safety and ad-

PLATE XI.

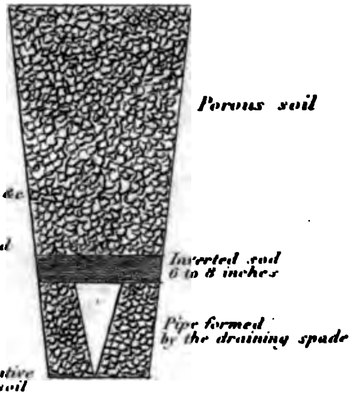
No. 1.

Hollow or covered Drain

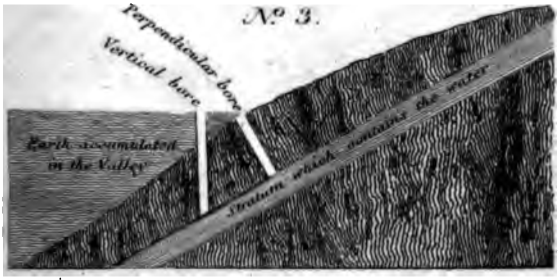

Porous soil
Thin inverted sod or straw &c.
Land stones round gravel or brushwood
Stone cover 3 or 4 inches thick
Triangle opening made with Flat stones and cut out of retentive soil

No. 2.

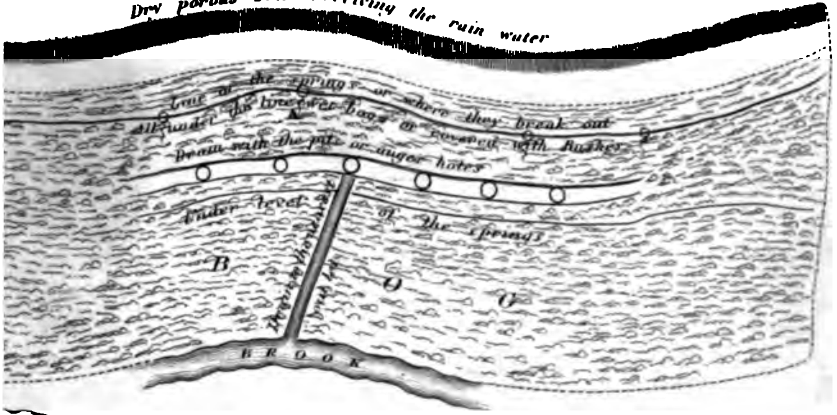
Pipe or Sod shoulder drain



No. 3.


Perpendicular bore
Vertical bore
Earth accumulated in the Valley
Stratum which contains the water

No. 4.


Dry porous soil receiving the rain water
Line of the springs or where they break out
All under the line wet bogs or covered with Rushes
A
Drain with the pits or auger holes
Under level of the springs
B
O
O
Drain to the brook
BROOK

vantage be applied to the most inferior lands, and by men of the most circumscribed limits in every respect.

The great importance of draining land from superfluous or stagnated water is now so generally felt or admitted as to render further comments on this head unnecessary. Experience has satisfactorily shown that its effects upon land under tillage are the production of more early, certain, abundant, and superior crops in every point of view, and that the application of any kind of manure is consequently not only more effective, but its durability incalculably increased. Upon grass lands it converts late herbage, void of nourishment, encouraging to diseases, and rejected by almost every kind of animal, into that of an early and nourishing quality, free from disease,* and palatable to animals of almost every description: in short, draining brings some kinds of land from a state of nuisance and uselessness, to a state of usefulness and profit; and in others it not only improves the quality and constitution of the animals grazing upon it, but the health of the surrounding inhabitants. Superfluous or stagnated water upon land originates in two ways, viz. either by descending in the form of rain or snow from the clouds, or ascending from springs or reservoirs of water in the bowels of the earth; and proves injurious to it in three different ways, viz. by lodging or stagnating entirely upon the surface, lodging in the body and surface of the upper soil, or being confined or stagnated under it. Such injuries are removed by means of drains and furrows, executed in various ways according to the causes which occasion them; consequently the minute and proper discovery of these causes is the first and grand object of attention. It is therefore my present intention to point out the most simple and efficacious modes of obstructing or removing such evils, which I shall proceed to do as above arranged: but it may first be proper to give a description of the necessary implements for draining, the various drains in common use, and the proper method of executing them; with some conclusive remarks relative to making drains in general.

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* Draining sheep pastures has been found, from experience, completely to banish that incurable disease, the rot.

SECTION II.

NECESSARY IMPLEMENTS.

There are various kinds of tools employed in draining; but the common spade, shovel, and pick are in most common use, and in many situations found quite sufficient, particularly if the extent to be drained is not large. I have had all the various modes of draining completely executed by them, with the assistance of the common peat spade, when pipe drains were necessary. However, where draining is to be executed upon a large scale, it will be found more expedient to be provided with proper draining spades, and an auger to tap the springs. There are generally only two spades in use for the formation of drains, lessening in breadth gradually so as to form a regular contraction to the bottom of the drain: the length of such spades are made to suit the necessary depth of drains in the different countries where they are used. The first, or upper spade, is similar to the common garden spade, contracted at the lower end; the lower draining spade is as broad at the upper end as the first one is contracted at the lower end, and it tapers gradually to a sharp point: but when shoulders are intended to be left at the depth of the first draining spade, to support an arch over a square cavity, another kind of under spade is used, similar to a common peat spade, or constructed in any other way which the intended cavity may direct. In addition to these spades, shovels and scoops are used for levelling and cleaning out the bottom of drains, which are likewise made in various ways to suit the dimensions necessary. The sod-knife is likewise an instrument in great repute, being far superior to the common spade for rutting or lining off drains: it consists of a sharp blade, about twelve to fifteen inches long, with a small projection at the top as a tramp for the foot: the handle is about three feet long, turned at the top, with a handle about the middle of it, similar to those upon a common scythe: the turn at the top and cross handle are placed in opposite directions to answer the hands for working. The auger is an instrument used by all scientific drainers for tapping springs, and is found to be a great saving of expense in cutting, from its occasional perforations in the bottom of drains, preventing the necessity of making the cut to that depth which, in many instances, the level of the outlet will not admit.* As to the description of the auger, and manner of using it, I can insert none more suitable than the following, given by Mr. Johnstone in his Treatise on Draining. "The borer, used in draining, is nearly similar to that made use of in searching for coal, or other subterraneous minerals. The auger, shell, or wimble, as it is variously called, for excavating the earth or strata through which it passes, is from two and a half to three and a half inches in diameter; the hollow part of it one foot four inches in length, and constructed nearly in the shape of the wimble used by carpenters; only, the sides of the shell come closer to one another. The rods are made in separate pieces, of four feet long each, that screw into one another to any assignable length, one after another, as the depth of the hole requires. The size above the auger is about an inch square, unless at the joints, where, for the sake of strength, they are a quarter of an inch more. There is also a chisel and punch for screwing on, in going through hard gravel or other metallic substances, to accelerate the passage of the auger, which could not otherwise perforate such hard bodies. The punch is often used when the auger is not applied, to prick or open the sand or gravel, and give a more easy issue to the water. The chisel is an inch and a half or two inches broad at the point, and made very sharp for cutting stone, and the punch an inch square like the other part of the rods, with the point sharpened also. There is a shifting handle of wood that is fastened with two iron wedges affixed to it, for the purpose of turning round the rods in boring, and also two iron keys for screwing and unscrewing the rods, and for assisting the handle when the soil is very stiff, and more than two men required to turn it. The manner of using it is simply thus: In working it, two, or rather three men are necessary. Two stand above on each side of the drain, who turn it round by means of the wooden handle; and when the auger is full, they draw it out, and the man at the bottom of the trench, who clears out the earth, assists in pulling it out, and directing it into the hole, and who can also assist in turning with the iron handle or key, when the depth and length of rods require additional force to perform the operation. The workmen should be cautious in boring, not to go deeper at a time, without drawing, than the exact length of the shell, otherwise the earth, clay, or sand, through which it is boring, after the shell is full, makes it very difficult to pull out. For this purpose, the exact length of the shell should be regularly marked on the rods, from the bottom upward. Two flat boards, with a hole cut into the side of one of them, and laid alongside of one another over the drain, in time of boring, are very useful for directing the rods in going down perpendicularly, for keeping them steady in boring, and for the men standing on when performing the operation." It would appear that the use of the auger for tapping springs in draining was first, and accidentally, brought into use by the celebrated drainer Mr. Elkington;* but the use of the auger in boring in the bottom of wells, to save the expense of digging, seems to have been an ancient practice in Italy.† The tapping of springs by sinking pits, has been some time in practice previously to the general use of the auger. Various kinds of ploughs have been invented for draining land, and assisting in making drains; but although they are found to be of advantage in some particular situations, yet they have given way in many instances to the draining spades.

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* Mr. John Johnstone, in his Treatise on Draining, according to Mr. Joseph Elkington's system, disapproves of using the auger as an assistant for directing the proper line of cutting drains; but I have invariably found it of the utmost importance in this respect, particularly in such situations and seasons when the direction for cutting was not visible upon the surface by a growth of rushes, alder bushes, &c. or dampness of the soil.

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* It seems to be a matter of dispute by some, whether Dr. James Anderson or Mr. Joseph Elkington is entitled to the merit of first applying the auger in draining land; but Mr. Johnstone, in his explanation on this head, quotes the discovery made by Mr. Elkington to be in 1764; whereas, Dr. Anderson's publication on the subject, does not appear until 1775, where he merely suggests the idea of using the auger to save the expense of tapping springs by sinking pits. But be this as it may, Mr. Elkington is certainly entitled to the merit of bringing it into general use.

† See Buffon's Natural History.

SECTION III.

DIFFERENT KINDS OF DRAINS MOST COMMONLY USED.

Generally speaking, all the drains in use may be denominated open or covered drains; but as the making of each of them varies materially, according to circumstances, I shall speak of their varieties separately.

OPEN DRAINS.

One kind of open drains are such as are used for conveying water into some neighbouring brook, or river, which are sometimes called ditches or main drains: the dimensions of such must vary according to the fall necessary to convey the water from the adjoining lands, the kind of soil through which they are cut, and the quantity of water to be discharged. It is necessary that all such drains should be wider at top than bottom, for if made with perpendicular sides, they will less or more, almost in every situation, crumble into the drain and stop the progress of the water, not only from their exposure to rain and frost, &c. but from the frequent cleanings which such drains require, and the sudden floods which occasionally occur, the sides are gradually undermined: this is more general when a drain is cut through a porous soil or moss. However, no stated proportion which the bottom ought to bear to the top can be given, as this will depend so much upon the requisite depth of the drain and nature of the soil; but, in general, where the drain does not exceed from three to four feet in depth, the bottom may be about one third the width of the top. In most situations the narrower the bottom is the better,* as the drain is thereby not only more easily cleaned out, but the water being consequently contracted will keep it longer from requiring it. It is a common practice, and sometimes necessary, to lay most of the material coming out of such a drain upon one side to form a fence. When this is the case, a small cut should be made behind such material, with occasional openings, into the drain, to remove all accumulation of water, in order to prevent the fence from bursting and falling into the drain. However, when no such fence is necessary, and the drain made through some impervious soil, such as stiff clay, &c. the material may be laid on both sides, at a sufficient distance from the brink of the drain, so as not to moulder down into it, with openings to allow surface water to pass, when it can be removed at pleasure. But if the soil through which the drain is cut is of a porous nature, the material should be removed as soon as it is thrown out; for if allowed to lie only a few days, the pressure and moisture running from it not unfrequently causes great parts of the sides to give way and fall into the drain, and likewise when such is allowed to remain upon the sides of a drain in a porous soil, it consolidates them so much as to prevent the filtering of water from the adjoining ground, which perhaps was the original cause for making the drain. It frequently happens that, in making such drains through wet boggy land, there is no possibility of keeping the sides from running together, and closing up the cut as it is made: in such a situation, where a considerable depth is required, it is necessary to finish it by degrees; first taking out a little of the substance throughout the whole length of the intended drain, allowing a certain time for that to have its effect, before commencing a second course, and so on until the proper depth is acquired. In some very spongy bogs it is most practicable and effectual to finish one half the depth of the drain in one season, and the other in another. The implements necessary for making open drains in almost any situation are, the common pick, spade, and shovel, with a long shaft used for removing the loose substance from the bottom of the drain. Small open drains are likewise used for conducting water into large ones, which are generally made so wide at bottom as to admit a common spade or shovel, and as wide at top as the nature of the soil and depth of the drain may require, to prevent the sides from falling in. Such open conductors are frequently made with the plough, and deepened or cleaned out with a spade or shovel.

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* The breadth of a common spade will in general be sufficient.

COVERED OR HOLLOW DRAINS.

These drains are made in various ways according to the nature of the soil and the purposes for which they are intended. Such of them as are filled with loose stones,* or other porous material thrown in promiscuously, are generally termed covered drains, and are used when the drain is to receive the water through its sides from the substratum in which it is formed:† but such as are made with stone or turf, &c. merely to form a cavity at the bottom for the water to pass, are called covered hollow drains, and are in use when the water is to be received from the bottom of the drain, or for conveying it from one part to another; which kind of drain is infinitely preferable when the auger has been used, as the water immediately finds an open channel to receive it. But when a drain is intended to receive water both from its sides and bottom, the above methods of filling up with porous material, and leaving a channel below, must be united.‡ Draining by means of hollow drains seems to be very antique, as it is said that the present Persians are supplied with water in their most fertile fields by this method, although they know not whence or in what manner the water is brought, being quite unacquainted with the arts by which a more ingenious people, in former times, contrived to deprive one part of the soil of its superfluous moisture, with a view to enrich another.§ The Romans likewise seemed to be well acquainted with most of the modern methods of hollow draining, from the description given by the ancient writers, Cato, Palladius, Columella, and Pliny, who particularly describe certain methods of executing such drains as have lately been considered modern improvements.* The best of the French writers on agriculture, De Serves, who published in 1600 his *Théâtre d'Agriculture*, describes hollow drains particularly, and in England the system seems to have been known upwards of three hundred years ago.

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* Drains made as above described, are, in some places, termed 'rumbling sivers,' or 'cobble drains.'

† See plate, No. 1. from the top down to the stone cover.

‡ See plate, No. 1. from top to bottom.

§ Forsyth's Agriculture, vol. i. p. 319.

MATERIALS FOR FILLING UP HOLLOW DRAINS.

The materials most suitable for making such drains are, stones, brushwood,† heath, straw or rushes, &c. each of which is preferred according to the expense of obtaining them; but stones or wood are most generally used, and ought in most cases to be preferred. Some give a decided preference to the latter, for this reason, that as the wood decays the water continues to pass; whereas, stones not decaying, and the earth becoming quite solid round them, when any obstruction takes place, the filtering of water is for ever stopped.‡ But notwithstanding this sound reasoning I would invariably prefer the former when they can be had at all convenient, and founded upon a hard firm bottom,§ having repeatedly found from experience and observation, that drains properly made with stones are less liable to be choked up, from whatever cause, than those made with wood or other perishing materials, although, upon such land as will form a firm durable arch, when such materials are decayed and run off, drains at first filled with them, have been found to answer the purpose, and last from thirty to forty years. It may therefore be concluded that all the different materials above mentioned will be found useful when properly applied, viz. stones, when the ground is firm, much water to be discharged, or when one drain is to be a receptacle for others; wood, where the ground is soft or liable to shrink, and a constant sharp run of water; straw, heath, or rushes, &c. where the soil will quickly form a durable arch sufficient to support any pressure to which the drain may be afterwards exposed. But necessity no doubt will frequently cause such materials to be improperly applied.

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* The passages of the above writers on this subject are quoted and translated by Mr. Dickson in his Husbandry of the Ancients, vol. i. p. 358.

† Willow, alder, asp, or beech boughs, are most durable, which ought to be put into the drains green, in which state the willow has been taken out of a bog after lying there for thirty years; but if these materials are put into drains in a dry sapless state, a rapid decay will take place.

‡ The above is Lord Petre's opinion on the subject of filling drains with wood.

§ When drains made in soft ground are filled with stones, they sink, and the earth works up among them, whereby the drain soon becomes useless: in such situations wood ought at least to be the foundation, which will prevent the stones from sinking; but, if practicable, sod or pipe drains should here ·e the preference.

DIMENSIONS FOR CUTTING HOLLOW DRAINS.

The proper depth must vary according to the nature and situation of the soil, as the deeper that drains are cut in a porous soil, in general, greater is the improvement;* but after reaching an impervious soil through which water will not penetrate, it is quite unnecessary to go deeper than a few inches into such a soil, which is of advantage in forming a more durable channel for the water, and a more secure foundation for the material. However, the most common depth is from two to three feet; but the level of the main drain to carry off the water, the level of the spring to be caught, or the depth of moisture necessary to be removed, must likewise regulate the depth of hollow or covered drains. One general rule must however be observed, that whatever kind of material drains are filled up with, or of whatever depth, they ought to be, when covered up, beyond the receiving of injury from cattle's feet when grazing or ploughing, either by breaking the surface or affecting the position of the material. The depth of covering, from the top of the material to the surface, must necessarily vary from six to twelve inches, according to the firmness or looseness of the covering or materials, as a drain, with a dry covering of six inches, will receive as little injury by horses when ploughing, as one with twelve inches of a loose wet covering; and those filled with stones will not require so deep a covering to prevent injury, as such as are filled with brushwood: hence arises one of the reasons for giving a preference to stones, particularly when the evil to be removed lies near the surface. The width is generally such as to allow a person to work, but it likewise varies, owing to the kind of material to be used in filling up; if stones, cut the drain perpendicularly down to the bottom, which need not exceed a foot, should the stones be small and only coupled together at the foot or thrown in promiscuously; but if they are large, or to be laid in the form of a conduit, from sixteen to eighteen inches may sometimes be necessary. When wood is used, it is common to bring the drain to two or three inches at the bottom, with a narrow pointed spade, or to leave a shoulder on each side,* a few inches from the bottom, so that the brushwood, when trampled in, may leave a small cavity for the water to pass. If any of the other decaying materials are to be used, a narrow cut from top to bottom ought to be made; as the arch formed above must here, in a very short time, be the sole dependence, and the narrower it is the stronger it will be. In all situations where materials of any kind are scarce, the drains ought to be cut as narrow as possible, being a great saving of material.

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* In damp situations the farther that the level of the superfluous moisture is reduced below the surface, less injury will vegetation sustain.

MAKING COVERED OR HOLLOW DRAINS.

First cut out the earth or other substance for the reception of the materials to form the drain. The expense of doing so may, in many instances, be greatly lessened, and the work done with greater facility with the assistance even of the common horse plough, by taking a furrow off each side of the intended drain.† Suppose the breadth of two furrows left to be sufficient for the width of the drain, split the space left with the plough, and the required breadth will be clear, one furrow deep, in the centre: but should the breadth of four furrows be wanted for a drain, the plough must commence again, opening a new furrow upon each side of the ground already ploughed, as deep as possible, and close upon the back of it; and by continuing so to plough until the ground is all turned over a second time, the breadth of four furrows will be left clear in the centre for the drain, which is even necessary upon some loose soils, where only the breadth of two furrows is wanted for a drain, so that the loose earth may be farther removed from the brink, and not so liable to be turned into the drain. This being done, the depth intended for a covering above the materials may be cleared out with a common spade and shovel, leaving perpendicular sides, which may be continued to the full depth of the drain, provided it is to be set in the bottom with stones: but if the drain is intended to be filled with small stones thrown in promiscuously, or with wood or any other of the materials formerly noticed, one or both of the draining spades may be used according to the depth wanted. Drains made with stones may be executed in various ways according to the kind of stone most convenient: should they be coarse, or such as are gathered off land, a large one must be laid on each side in the bottom from four to six inches asunder, according to the size of the stones intended to cover them, or the quantity of water to be discharged; all the largest of the stones left after such a conduit is made, must be put into the drain promiscuously, and the smaller ones in a similar manner above all. But should stones be scarce, gravel, free from sand, will answer to fill up with; and if there has been no sward to save at commencement, or none convenient, to cover over such stones, to prevent the gravel, when used, or earth, or sand, from choking up the drain, a little straw, heath, or rushes, must be put above them, and the drain filled up with the most porous part of the substance thrown out when cutting the drain, reserving that of the best quality for the top; and the remainder, if any, may be spread over any suitable part of the field. But when flat stones of about eight or ten inches square are to be had, forming a triangular space with them in the bottom of the drain, makes one of the most durable cavities for the water to pass. When such is intended to be done, the bottom of the drain should be formed with the under draining spade, or at least, in such a manner as that two flat stones when put into the bottom resting against the sides of the cut, and one laid across the top between them, will form at once a triangle with its base uppermost.* A triangular space is likewise sometimes formed in the bottom of drains which are cut with perpendicular sides and about one foot broad at the bottom; the stones are placed as widely separate as the bottom of the drain will allow, meeting together at the top: this no doubt is a saving of stones, as the bottom of the drain forms the base on one side; but if the ground is soft, or the bottom of the drain liable to shrink, it frequently happens that one side of the triangle gives way from one stone yielding and another not, as likewise from the weight of materials or pressure above; consequently the cavity becomes closed, and the run of water stopped. Such an evil is however remedied by the formation of the other triangle, for if one stone sinks, the other will do so likewise, their points being both together, and the greater the pressure from above, the firmer will be the triangle, provided the upper stone is strong enough as it ought to be. When such drains are intended to carry off permanent currents of water from springs, or to receive the water of lateral drains for which they may act as a main one,† the cavity should be much larger than when the water is merely from one source and trifling; about six to eight inches square are generally found sufficient: in the latter case, when there is a good declivity, it is seldom necessary to set the stones in the bottom, as throwing in clean stones promiscuously will form sufficient cavities to carry away the water. In making covered or hollow drains with wood, strong short pieces are generally laid first across to support others laid lengthwise, so as to form a cavity below; or a cavity may be made in the following manner: Place two pieces of wood at opposite sides of the drain, each resting upon the opposite side to that on which its lower part stands, so as to form with each other a St. Andrew's cross. The upper part of the cross is filled with brushwood laid longitudinally, above which straw is placed crosswise, and covered up with earth.* When any of the other materials are used solely for filling up drains, they are generally trampled in promiscuously, or sometimes made with ropes.† All drains filled either with wood or any materials subject to decay should be made with stones (in any of the ways already noticed) for a few yards at the extremities, which are exposed to the air: this would prevent that stoppage of water which so generally takes place at the end of such drains occasioned either from the rapid decay of the materials, or the trampling of cattle, or perhaps a combination of both. In finishing covered drains of whatever description, they ought to be filled immediately after being cut, otherwise they are liable to moulder in by frost or rain: but great care and attention ought to be paid before putting in the materials, to see that the drains are properly cleaned out, and so level in the bottom with such a descent as to admit of no water lodging anywhere; next to see that no earth, &c. is adhering to the materials, or put into the drain along with them; and lastly, to be particular in securing the top of the materials from earth or sand falling in, or being washed down among them by rain; which may be done by covering with turf, the green side down, or straw, heath, or rushes, and filling up the drain with such soil as will not injure the intended effect of the drain. But in order to get such drains finished in perfection it will be found advisable not to allow the person who digs to fill up; and although the former operation may be done at so much per rood, the latter ought to be performed by a steady conscientious person at so much per day.

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* See Shoulder or Pipe Drains.

† Ploughing can only be resorted to with saving and advantage where there is no suitable top sward for covering the material put into the drain, and not even then, unless the soil is so firm as not to be injured by the horses.

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* See plate, No. 1. A similar method to the above was successfully practised upon grass lands of a clay soil, by Sir Henry Fletcher, Bart. See Forsyth's Agriculture, vol. i. p. 324.

† Main drains ought always to be open if possible, so that when one of the lateral drains gives way, the seat of complaint is more easily discovered; and when any thing obstructs the water in the main drain, all the drains above the obstruction are rendered useless until it is removed, which is attended with great difficulty when the drain is covered.

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* See Forsyth's Agriculture, vol. i. p. 326.

† It is common upon stiff retentive clay soils to fill the drains with a twisted rope of straw, over which is speedily formed an arch sufficiently strong to support every casual pressure; and as the above straw shortly decays, and is carried off with the water, consequently a clear pipe is left.—See Forsyth's Agriculture, vol. i. p. 328.

SOD OR PIPE DRAINS.

These hollow drains are generally made by the materials first taken out of them, and prove effectual in many cases both in receiving water from the subsoil, and through perforations made with the auger in the bottom. They are chiefly made in pasture grounds with a stiff sward, and are executed in various ways. After lining off the width of the intended drain, which must be such as will allow a person to work, cut the top sod or turf neatly into pieces about eight or ten inches broad, and of such a thickness as the firm substance at top will admit: they must all be laid on one side of the drain, while the substance taken out below is laid on the other. Having cut the trench a proper depth square down in the centre of its bottom, cut out with a narrow spade* the intended cavity, which in mossy land is sometimes made eighteen inches deep; and after cleaning out and levelling the bottom of the narrow channel, cover it up with the top sod inverted, which will be supported by the shoulders or projections left by the spade in making the pipe or narrow channel; put in the substance taken out of the trench and the drain is finished.† Another method: after the drain is lined off, cut the top sward into the form of wedges, the grass side being narrowest, and of such a breadth that they will not go to the bottom of the drain; which is to be finished with the under draining spade: these sod wedges being put into the drain, green side down, and well trampled, will leave a water course, and the drain may be finished as above. When making these shoulder or pipe drains, a small scoop or hoe should be used for cleaning out the bottom of the drain while the covering operation is going on, as loose earth, &c. will accidentally fall in by trampling down the sod or otherwise.* When land so drained is of a stiff solid substance, such drains will not only be found most effectual, but of very long duration.

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* See Description, p. 368.

† See Plate, No. 2.

CONCLUSIVE REMARKS RELATIVE TO THE MAKING OF DRAINS IN GENERAL.

Drains upon such land as has not much descent, or where the quantity of water is small, ought to be as narrow in the bottom as other circumstances will admit, as the contraction will cause the water to run more freely and quickly off, and to create such a current as to keep the drain always clean, and prevent its being choked up: in such situations the more main drains the better, as the shorter the lateral ones are, a greater fall can be obtained, and when a stoppage does take place, less will be the injury. But where drains have much declivity, and great currents of water running through them either permanently or occasionally, the water ought not to be so much confined, but the drains made somewhat wider at the bottom, and to run obliquely across the direction of the declivity,† so that the water may be carried off in an easy gentle manner sufficient to keep the drain clear, but so as not to do any injury by its rapidity. All main drains ought to be open if the situation will admit, and others running into them should have as little connexion with each other as possible; by which means the failure of any particular drain is at once discovered; the evil occasioned by it is more partial and more easily remedied. The bottom of the apertures of lateral drains should be a few inches above the ordinary level of the run of water in the main drains, and should in communicating with them form very acute angles, so that the water when running from the side drains may be steering a similar course with that in the main ones: this will prevent stoppages which so frequently occur when the lateral drains join the main ones in a contrary direction, or even at right angles. If such side drains are merely to remove stagnated rain water in a porous soil with a retentive bottom, narrow cuts filled with any of the materials already mentioned, which may be most convenient and suitable, will answer, provided there is a good descent; or pipe sod drains may do equally well if the soil and materials are answerable. But when side drains are to remove water from springs, or rising up from the bowels of the earth from whatever cause, drains forming cavities at bottom, as has been already described, are most advisable, but more particularly when the quantity of water is large, or the drains have little descent. All main drains should be kept constantly clear, which generally has the effect of doing so to the side ones, and thereby greatly increases their durability. Drains of whatever description should have as much descent as to prevent stagnation of water, and run off any trifling impediment that may accidentally get into them. Open drains are most expedient and effectual for conducting large bodies of water acting as main drains, and draining retentive soils and plantations; and covered ones for draining land wet from whatever cause, when the soil is sufficiently porous to allow the moisture to percolate into their internal cavities. The distance which drains ought to be from one another will depend entirely upon the nature of the soil, the situation and state of wetness in which the land may be; but where retentive soils or mosses are to be drained by means of small hollow or pipe drains, it has frequently been found that not more than one rood asunder was requisite to prove sufficient: but this must vary very considerably according to the situation. When covered drains in any field, from whatever cause, become ineffectual, it is much better to make new ones than endeavour to remedy the defects of the old; and in doing so, if the situation will admit, it is preferable to cut the new drains transversely to the old ones, which sometimes causes the latter to operate and run freely; by which means a double advantage is gained, from draining the field more completely, and removing stagnated water that might have been in the old drains or artificial springs caused by their stoppage. There seems to be a difference of opinion among drainers as to the proper season for executing the work, some preferring winter and others summer; but as to this the farmer frequently makes no choice, but performs it according as circumstances best admit. It must however be evident, when a choice is to be made, that both seasons will have their advantages, owing to the description of land to be drained. Stiff clay land ought to be drained in summer, otherwise the work cannot be executed with any degree of neatness or perfection: fallow ground likewise ought to be drained in summer, that being the time when the line of distinction between wet and dry is most perceptible. The expense of making any kind of drains must vary very materially, owing to such a variety of circumstances that any statement which might be afforded here would not prove the least useful.

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* A piece of wood a few yards long, made to answer the intended pipe or water course, is sometimes used to great advantage when making such drains, as the wedges can then be trampled down without injuring the pipe below, and which likewise levels the bottom: the wood is pulled forward as the covering goes on, by means of a rope or chain fixed to the one end. A square piece of wood is likewise used to advantage in the directing of a drain built with stones at the bottom.

† Inattention to the above frequently renders drains very soon ineffectual by being undermined, and run up with sand or earth from the rapidity of the current.

SECTION IV.

DRAINING LAND INJURED BY STAGNATED WATER ON THE SURFACE.

Land injured in the above manner is chiefly of a stiff clay soil, so tenacious as to retain water in every hollow of the surface until removed by evaporation. Such land may be kept sufficiently dry by being put into ridges raised in the centre with a gentle declivity to the furrows on each side,* which ought to be well cleaned out with the plough, and so constructed at first laying out as to have such a descent as the water may run freely in them to some open drains for carrying off the water. The principal art, therefore, in keeping land of this description dry when of an even surface, consists in laying off the ridges in such a manner that the furrows may, as much as possible, have a regular descent to the open drains; and when the surface is uneven, to make as many of the furrows cross as many of the hollows, provided there is a sufficient descent from them to the main receiver; by which means the water being all collected into the hollows will be more readily and effectually carried off by small open cuts into the main drains, which are generally necessary to surround such land in order to receive the water from different declivities, and to facilitate its removal when the ground is approaching to a level.* Upon such ground as has a rapid descent from one end to the other, the ridges must be formed obliquely from the natural descent to prevent injury arising from floods, by running off the soil, and filling up furrows or drains so as to obstruct the course of the water; but upon retentive soils of such declivity little draining is necessary, as they seldom suffer much from surface water: the above, however, is highly essential when forming ridges, or making covered or open drains upon porous soils of such declivity.

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* The declivity should be such as merely to prevent water from lodging upon any part of the ridge without removing it too rapidly, which would soon fill up the furrows and obstruct the removal of the water.

All that is generally necessary to prevent retentive soils from being injured by stagnant surface water is, after the field has been sown and harrowed, to clean out each furrow with a plough drawn by a single horse, only cleaning out the loose earth drawn in by the harrow; for if more is taken out, it raises the sides of the ridges so much as to prevent the water from running off them into the furrows. If a common plough is used, it is sometimes necessary to go up and down the same furrow before it is complete; but once is sufficient with a double mould-boarded plough, which ought to be preferred, from not only being a saving of labour, but causing fewer footsteps of the horse, so injurious in some wet lands. After the above has been accomplished, (which is generally termed 'water furrowing,') similar furrows are made with the plough throughout all the hollow ground, so as to communicate with the other furrows and main drains: such communication being properly cleared out with the spade or shovel, and other necessary ones cut, where the plough could not be applied with effect, generally finishes the work: and a little attention immediately after the first flood of rain, by improving any defects with the spade, and observing that such furrows and drains are constantly kept clear, will remove all apprehension of the land being injured by stagnated surface water. But it may be observed, that such treatment will be far deficient in proving effectual, where a field has hollows surrounded with rising ground to a considerable height. In such a situation open drains would be exceedingly inconvenient, for, if made deep and narrow, they would soon be filled up by being exposed to frost, &c. and being made of such dimensions as to prevent this, would not only prove a waste of land, but the progress of the plough would be much retarded. The most effectual mode, therefore, in such situations, is first to find by means of a level, if there is a sufficient declivity to carry off water from the lowest parts of such hollows to the top of the ordinary run of water in the main drains, making an allowance for a covered drain made in the hollow sufficiently deep so as not to be injured by the plough: if such a descent is found as above stated, a covered drain must be made with a cavity at bottom, and such part of the drain as communicates with the hollow, must be filled up with some gravel or porous soil, so as to admit the filtering of water into the drain. But in some cases the descent will not admit of a drain being made in the hollow, and the accumulation of water in it is so great, that the land may be much injured before the water all filters into the drain: in this case it will be necessary to have a small grate upon the end of the covered drain;* which may be about the commencement of the rising ground: this will admit the water more freely and facilitate its dispatch. But where the hollows are considerably below the level of the main drain, or the surrounding ground of such a height or nature as to make the cutting of a drain through it impracticable, the only remedy is that used for land-locked bogs; (see sect. 7;) which is likewise necessary when no descent for a main drain can be had, and the impervious stratum of a great thickness. Should, however, land of such a retentive nature be so level that the water collected into the furrows or open cuts, as already described, flow down them in such a slow and easy manner as to be stopped by every trifling accident that may occur, it is generally found to be of advantage, and necessary, after laying out the ridges and main drains as formerly directed, to cut narrow drains in every furrow and hollow so deep as to reach the porous soil, and after having formed a triangular cavity in the bottom, fill up with small stones and some gravel or porous soil; by which means the rain water will be absorbed almost as quickly as it falls. The top of such drains may all still be open furrows, which will likewise facilitate the dispatch of great floods: such drains, however, are not necessary when the furrows or open cuts, as at first described, can be made to touch the porous substratum, which if deep, round ridges are necessary to effect it more easily.

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* The greater the number of main drains upon level ground, the quicker and more effectually will the water be removed, as the conducting furrows or small drains are thereby shortened; which being deepened a little at their extremities, an artificial descent is obtained from both ends of the drain until it meets in the middle, which will give a more certain and quick dispatch to the water than long level furrows or drains: hence arises the propriety of making small fields surrounded by main drains, upon level land.

SECTION V.

DRAINING LAND INJURED BY WATER LODGING IN THE SOIL OR UNDER IT.

When land is injured in the above manner, the evil may either proceed from rain water falling or collecting upon it, or by spring water arising in the subsoil, or overflowing from some adjacent highly situated spring. If the injury proceeds from the first cause, the soil will, in general, be porous above and retentive below:* drains must be cut through the porous soil a few inches into the retentive substratum, and either left open or covered according to circumstances. Should the ground have a gentle declivity to one side, one drain cut at the lowest extremity of it, with the assistance of the ridges being formed as described in the last section, will generally be quite sufficient; but when the ground has a descent from both sides, the drain must be made in the hollow, and in proportion to the number of hollows which may be in the field, must be the requisite number of drains. But when the descents in a field are long, or the water occasionally interrupted by beds of retentive strata, arising near or close to the surface across the declivity,† the drains must then be more numerous, and some of them differently directed: and if merely the former, and a regular descent between the soil and retentive subsoil where the great body of water lodges, drains cut at necessary distances from one side of the field to the other, but forming obtuse angles, or having descents to certain points, so that the joining of them may form a drain running in an oblique direction from top to bottom of the field, somewhat near its centre, will be found greatly to facilitate the dispatch of the injurious water: but if the latter, it will be necessary to have such a number of drains running obliquely across all the retentive beds, from the main drains in the hollow, as the state or situation of the field may require. Should the impervious beds run regularly across the declivity of the field, and the surface have all one descent to the hollow, one drain cut in an oblique direction through all the beds, joining with that in the hollow, will frequently be sufficient; but if the effect should be too slow, as may sometimes happen when the ground is extensive, and the soil, though porous, yet inclining to a retentive nature, or hollows formed in the surface in the same direction as the declivity, more of such drains may be made as the necessity of the case requires; or small drains cut close to the upper side of the impervious beds, and communicating with one or more of the oblique drains, will in some situations answer best. If the obstructing beds are not regularly across the field, but are partially here and there, forming such figures as to retard or stop the running or percolating of the water, more than one of the above oblique drains will likewise be necessary; and they must be directed in such a manner as to intersect as many of the beds as possible,* having branches connected with them, which will intersect such of the beds as they could not be made to do properly. If there is a continuance of rising ground above that intended to be drained, it will be necessary to have a drain running between them,† which the forming of the fence may be made to answer the purpose, by cutting the depth already specified. When there is no descent from the field to be drained, into the surrounding ditches, a number of main and small leading drains are frequently necessary to obtain artificial descents for the water.‡ When the injury which land receives from water lodging in the body of the soil, or being stagnated under it, proceeds from the second cause, viz. from springs either arising up from the subsoil promiscuously throughout the field, or from their effects in the upper part of the same field, or some adjacent high ground; such land may either consist of a porous soil with a retentive bottom, or a retentive soil with a porous bottom, both of which are equally liable to be injured by springs; for although the injury done in the latter may not be so visible to the eye, from the water being kept invisible by a retentive covering, which may either be the whole of the upper soil, or a thin stratum of it, yet the continual damp and cold so kept up is found particularly injurious, and productive of the most inferior kind of herbage, even in situations where the surface may appear quite dry and firm, and the progress of the plough not the least retarded: it must therefore here be of equal importance to properly discover the nature and *lye* of the different strata below the surface,* as it was in the first case to ascertain the direction of the impervious beds. It is in the attempting to drain land injured by springs in the above manner, that so much money is unnecessarily expended by some, which deters others from making a similar attempt. How common is it for people who are entirely ignorant of the art of draining, to cut drains in all directions by chance, throughout a field, and of such a depth and directions as to prevent, no doubt, the rising of water so near the soil as to injure it, when perhaps one or two drains scientifically executed would more effectually cure the evil. It is here where I conceive the celebrated drainer, Mr. Elkington, has most merit, as I at one time supposed myself rather an effectual and economical drainer, but found that I was far deficient, particularly

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* The bars of the grate ought to be made very close so as to admit nothing that might injure the drain; indeed when land is constantly under tillage, the grate ought to be covered with wire or willows wrought as close as a sieve, to prevent as much as possible any of the soil from running into the drain: a few loose stones laid round the grate would assist in this particular, and which stones could occasionally be stirred up, and the sand or soil stopt by them be removed: the grate might be made to take out at pleasure, so that the soil, &c. collected immediately behind it might also occasionally be removed.

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* Although rain water may be most injurious to a porous soil with a retentive bottom, yet it is sometimes equally so by being confined in a porous stratum below a retentive soil, having entered upon some higher ground of a porous soil with a retentive bottom. This evil, however, is easily remedied, by cutting a drain across the head of the field, through the porous soil that admits the water.

† Should alternate beds of porous and impervious strata run with the declivity, the drains cut in the hollows as above described will in general be sufficient; but it will sometimes be necessary to form drains, as described, for long and regular descents between the porous and retentive soils.

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* A proper discrimination of the impervious beds will save much unnecessary cutting: it ought therefore to be most minutely attended to. When a field is newly ploughed, or in fallow, the impervious beds may be at once distinguished by the appearance of the soil, provided they come to the surface or within reach of the plough; and when the field is in grass, the nature or colour of the herbage, and firmness of the ground, will be the best guides. But should the seat of complaint be so deep as not to be discovered by such symptoms, the evil will then not be so great, and may generally be remedied by a few drains being cut obliquely to the declivity through the field.

† Drains cut as above are generally termed 'catch drains,' and are in great repute in high districts, on the upper side of roads, to prevent injury by floods, &c.

‡ For artificial descents see note p. 384.

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* The above may be ascertained by examining the bed of an adjoining river, and the sides of the banks cut by it, or from any pits, wells, or quarries that may have been dug in the neighbourhood. Rushes and other coarse aquatics may facilitate the investigation; but these, being often produced by stagnated rain water, where there is no spring, cannot be trusted to in cases where more minute precision is necessary. See Johnstone on Draining, p. 22.

in the latter, when I began to apply some of his ideas on the subject,[*] viz. taking the level of springs, &c. and applying the auger. But before proceeding to point out the method of draining land injured by springs, the leading features of which being according to Mr. Elkington's system, it may first be proper to state that draining, according to his principles, depends upon three particulars: "1st, Upon finding out the *main spring*, or cause of the mischief, without which nothing can be done. 2d, Upon taking the level of that spring, and ascertaining *its subterraneous bearings*; for if the drain is cut a yard beyond *the line of the spring*, you can never reach the water that issues from it, and by ascertaining that line by means of levelling, you can cut off the spring effectually, and consequently drain the land in the cheapest and most eligible manner. And, 3dly, By making use of the auger to reach or *tap* the spring, when the depth of the drain is not sufficient for that purpose."[†] Suppose then, that after minutely examining the land in question, no outlets of springs can be discovered either in or about it, but that it appears all equally wet, or the soil damp at the bottom: in this case the water must have some vent below the surface to prevent its bursting out, but not until it has arrived to such a height as to injure the soil. In order, then, to discover the invisible cause, if the ground is upon a declivity with higher lands adjoining, first cut a drain along the head of the declivity through the porous soil,[‡] and a few inches into the retentive bottom; and if one or more springs are opened by the drain, the evil may perhaps be then removed without further trouble, having proceeded from the water issuing from them being dispersed throughout the field from various interruptions. But if no spring is discovered in cutting the drain, but a considerable quantity of water issues from the porous soil; this may be the dispersion of distant springs or rain water collected from a porous soil above, which being removed may likewise tend to remedy the evil. However, after waiting a reasonable time, if the drain so cut does not prove effectual, similar drains may be made around the whole field, which in many cases are necessary in forming a fence; and if any springs are then discovered either by cutting or perforating with the auger,* drains cut across the field upon the same level with the springs discovered will in general prove an effectual cure.† But if no springs can be discovered, the only remedy left is to cut drains in such numbers and directions, as already described for the different situations injured by the collecting or falling of rain water;‡ which, if they do not touch upon the main spring of the evil, will at least remove their effects beyond the reach of injury, as all drains intended to remove water arising from the bowels of the earth, if it be not practicable to cut them so deep as to completely remove the water, must invariably be cut so deep as to reduce it to such a level as will not be injurious to vegetation. If the burstings or outlets of springs are visible upon the surface, (which will mostly be the case, although sometimes at a great distance from the spot to be drained,) drains cut upon the same level with them, and connected with one to conduct the water to the nearest brook or main drain, will be sufficient: but here the making of a number of drains may be saved by distinguishing the main springs,§ or the nearest leakages or outlets from them, from the more distant burstings or outlets; and cutting drains on a level from them alone, will speedily reduce the number of apparent springs and their injurious effects. Where ground is very level, after discovering the springs, &c. and cutting drains as already directed, the next thing necessary is to find out, by levelling, the nearest and best declivity for the drain, which must communicate with those cut upon the level of the springs, to carry off the water: but when the level of the outlet for the water, or the expense or difficulty of cutting, will not admit of drains being cut so deep as to remove the evil, or even reduce the water to a level not injurious, perforations in the bottom of the drains with the auger must be made so as to reach or tap the springs so as to give vent to the injurious water. In order to prevent the auger holes from being filled with earth or sand in time of floods or otherwise, small openings may be made along the upper side of the trench, but not cut so low down as the bottom of the drain by some inches, where the perforations may be made. This, however, will not be necessary when the springs are strong, as the force of water will then keep the holes perfectly clear. But in situations where the springs are weak or the ground too hard for making proper auger holes, or the soil of such a nature as to close after they are made, sinking pits and filling them up with stones will answer much better, and prove more effectual.* In cutting drains, sinking pits, or perforating with the auger, in order to tap injurious bodies of water upon hill sides or any considerable declivity, the work may be greatly facilitated, and both labour and ex-

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[*] I have already stated, that it appears to be a matter of dispute by some, whether or not such ideas are originals of Mr. Elkington: this I do not pretend to discuss, and have merely to state that I am solely indebted to Mr. Johnstone's account of them, for the supposed advantages which I have derived therefrom.

[†] Johnstone on Draining, p. 9.

[‡] Should the upper soil be retentive with a porous soil below, they ought both to be cut through into a retentive bottom, which will not in general be far off upon such land.

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* After cutting the drain a convenient depth and no satisfactory spring is discovered, holes may then be made with the auger in various parts of the drain, in order to find out the springs.

† If by boring with the auger a spring is found, which immediately flows up through the hole, a drain cut on a level with the hole, with similar borings in it, will be sufficient to remove the evil; but if the spring found by the auger does not flow up to the surface by some feet, drains must then be cut upon the ground which is level with the water in the hole.

‡ See page 387.

§ Main springs, or their nearest outlets, generally discharge the greatest quantity of water; and those orifices which never dry up, or continue to run

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longest in dry weather, are always either the springs themselves or near neighbours to them. Leakages break out both above and below the main spring, according as the course of the water is interrupted below the surface, and are frequently taken for the main spring, and drains cut, which remove them without ever touching upon the spring which causes the injury.

* The depth of the pits will depend upon the depth of the evil to be removed, and the width must be such as to admit a man to work: a thick wooden peg is sometimes driven into the centre of the pit, and after the stones are filled in, it is pulled out, which makes a better vent for the water: it is, however, advisable to have the pits a little to one side of the bottom of the drain, and built up about six inches above its level, similar to the auger holes.

pense saved, by digging or boring perpendicularly to the stratum which contains the water, and not vertically downwards, as is most common: this is at once illustrated by a perpendicular direction being the shortest which can be drawn from any given point to a given line. (See plate, No. 3, for this and further illustration.) The inclination of the stratum which contains the water may be discovered by perforating* in two or more places along the declivity; which, being of the same depth or nearly so when they reach the water or stratum which holds it, will show that it has a similar inclination to the surface: † the nearest line, therefore, will be in a perpendicular direction from the surface, and not vertically downwards. But if the depth of the perforation vary considerably, the stratum will in general lie horizontally through the hill or bank, therefore the nearest line in this case will be to bore vertically down, and not perpendicularly to the surface. But the stratum, when lying horizontally through a hill or bank, may sometimes be known without perforating by the surface below its level being wet and rushy, and the upper side of which varying very little from a level all the way round the eminence; (see plate 4;) but when the line of rushes is not nearly a level, there is then every reason to suppose that the stratum which contains the water does not lie horizontally through the hill, but irregularly, and with the same declivity as the surface: and if the hill is dry on the other side, it is a proof that this is the case, or that the stratum which contains the water does not go through the hill, but lies upon the one side with a retentive soil both below and above, forming a kind of bag for the water to lodge in; which is admitted by the soil of the upper part of the hill being porous, and is stopped at the bottom of the hill by the meeting of the under and upper retentive strata which form the bottom of the bag; and as it begins to fill, the upper soil is rendered damp and wet from the water oozing up through its weaker crannies; (see plate, No. 4;) and when the bag is quite full, the wetness and damage is greatly increased from its overflowing the surface, as at the line where the springs break out in plate, No. 4, and covering all the ground down to the brook: consequently, in attempting to drain a hill side wet by any of the above causes, the object to be aimed at is to give vent to the bottom of the bag or the lowest level of the porous stratum which contains the water, by cutting drains and perforating,* if necessary; of which the following is the shortest, cheapest, and most effectual method. Begin a drain as far down the hill as the level of the nearest brook or outlet will admit; proceeding upwards to the wet ground, bore holes with the auger in the bottom of the drain to a considerable depth, occasionally as the drain is carried on, always directing the auger in such a direction as the stratum which contains the water may be supposed to lie; and as long as the water is not found by boring, the drain must be carried on, and new perforations made until the lowest part of the reservoir is penetrated by the auger,† when the water will immediately flow up. If the root of the evil is thus found, another drain must be drawn across the one already made and the declivity of the hill, forming a figure similar to that represented in plate, No. 4, or otherwise, as the situation may best dictate; but always having a regular descent to the first-made drain, and with auger holes made at short distances in the bottom of the last-made one, so as to give free vent to the water: but when some of the holes made in this cross drain do not produce water, the line of drain in such places is therefore below the level of the reservoir: auger holes must then be made a little higher up the hill, and the water issuing from them conducted by small cuts into the drain. When the bottom of the reservoir which holds the water, lies below the level of the nearest brook or outlet to it, a drain so formed as to carry off the water with perforations in it, will in general reduce the reservoir to such a level as not to be injurious.* When it is necessary to make the cross drains a considerable way round a hill, it may be advisable to have more conducting drains than one if the situation will admit. Such a method of draining hill sides will greatly remedy, if not entirely prevent the formation of bogs in hollows upon elevated situations; it likewise affects distant grounds according to the inclination of the stratum, which if horizontally through a hill or bank, such drains made on the one side will completely dry the other.†

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* It would be proper before using the auger, first to make a small pit through the upper soil if porous, so that the exact quantity of water may be seen, which would otherwise be partly, if not wholly, absorbed when it reached the porous soil at top.

† The above inclination may sometimes be known by the one side of the eminence being wet and the other dry, although this may occasionally proceed from other causes. See Johnstone on Draining, p. 23.

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* See drain with auger holes, plate, No. 4.

† Mistakes here frequently occur by finding water which proceeds from small leakages from the main reservoir, being supposed to be the reservoir itself: this, however, can only best be known from the extent of adjacent high ground, which if great and the water issuing from the auger hole trifling, there is every reason to expect that the great body of water is not reached; but by proceeding a little farther up with the drain, and having two or more auger holes running with water, a choice of the one most likely to have reached the main body of the water, may be taken for commencing the cross drain from.

SECTION VI.

DRAINING SHEEP PASTURES.

The remarks already made in this chapter, I trust, will be sufficient to assist in all the ordinary cases of draining land, whether under tillage or pasture; and by lining and executing drains as described,‡ according to different situations, extensive tracts of sheep walks may be drained at little expense, particularly as all the main drains may be left open, with necessary bridges made for sheep to pass; and the small side drains may either be left open or covered with turf, according as the nature of the soil may seem to dictate. But the general principles on which this particular system of draining seems mostly to depend, are, making the drains as long and straight as possible, with a regular but not abrupt descent, running them in the same direction with the brook or river on the banks of which they are cut. The advantages of such are, that the longer that such drains are, they will collect more water, and will consequently keep longer clean and open; that the straighter that they are, the water in time of floods is not so apt to run over; that the descent not being too rapid will dry the ground better, and, if the soil is porous, the drains will not be so apt to be filled up by the current making pits in the bottom; that if a drain is made to rún in a contrary direction to the river or brook, it will consequently fall sooner into the stream, and from want of the command of the descent it cannot be conducted to the various reservoirs in the way. Sheep walks in general suffer most from stagnated surface water, the best means of removing which is by small open drains cut with a spade made for the purpose, so as to bring them to a narrow channel,* varying from two to three inches, or six to twelve inches as the situation of the ground may require; but it is of advantage not to have them too deep, and well sloped away at the sides, as they are consequently not so liable to be injured by the sheep. They must be made in such directions as will best catch and carry off the water, communicating with each other until the water is discharged into the nearest brook or main drain; and when some of the side drains have a number of others connected with them, they must be made a little larger in proportion to the quantity of water they have to receive, having such a regular descent as not to be injured by the rapidity of the current, but sufficient to run off trifling obstructions, and keep themselves clear. Such a method of draining is no doubt the cheapest, and in some shallow porous soils is perhaps the only and most effectual one which could be adopted for removing surface water: but the expense of making such drains, which varies from one to three farthings per rood, more or less according to circumstances, may be greatly lessened by using a strong common plough, and turning up furrows with it in such places as the water is stagnated, and the loose soil being pared off such furrows with a spade, leaving the grass furrow three or four inches thick; which, by being turned over again to the place from which it was taken with the grass side uppermost, will leave a cavity for the water, which will readily subside into it. But upon soft and deeper soils, neither of the above methods of draining will answer well; for by the former the drains are very apt to be filled up by the trampling of sheep, while the latter is subject to the same injury, unless a very deep furrow is made at first, and the land much injured by stagnated water in the footsteps of the horses. In such situations, therefore, where the soil is generally either moss or clay, pipe shoulder drains, made in the following manner, ought to be preferred. After the drain is lined out in the intended and most suitable direction, and the top sward cut as deep as it will rise in a firm state, let it be laid carefully to a side, removing any loose earth that may be adhering to it and in the bottom of the trench so made; then cut a narrow pipe as directed in page 380, and cover it up with the top sward, grass side uppermost: when the ground is firm and tough, such drains will even answer for draining hill sides by means of the auger, as has been already noticed. But if the ground is such as will admit of the plough turning up a thick firm furrow, without being injured by horses' feet, the loose earth may only be removed from the furrow turned out, keeping it as thick as possible; and instead of making a pipe with the spade as above, a cavity may be formed with the plough going back in the same trench, and the top sward replaced as a covering. This last method of draining sheep pastures, although perhaps a little more expensive at first, yet ultimately will prove the cheapest, as when properly executed the drains will run a long time without any repair whatever; whereas, the open cuts are liable to be filled up, and consequently require occasionally to be cleared out. But as such modes of draining have both their advantages according to the nature of the soil, one or both must therefore be practised as circumstances may best dictate.

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* For further illustration, see Mr. Johnstone's account of Mr. Elkington's system, plate, No. 3.

† See Mr. Johnstone on Draining, p. 23.

‡ What is more particularly referred to above, are the last remarks made in the last section upon draining hill sides, and those made in the beginning of the section relative to alternate beds of porous and retentive soils.

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* The proper slopes for the sides of the drains, and the narrow channel, may at once be formed while lining out with a common spade, by making the ruts with a slope and not perpendicular, and the drain cleaned out with a spade contracted at the point.

Such attention being paid to the draining of sheep pastures, will not only greatly improve the quality of the sheep and herbage, but completely extirpate that incurable disease, the rot.

SECTION VII.

DRAINING LAND-LOCKED BOGS, OR SUCH LAND WHERE A DECLIVITY CANNOT BE OBTAINED TO CARRY OFF WATER.

Having already shown various ways of extracting superfluous or injurious water from the bowels of the earth, and likewise removing it from the surface, any further disscussion on the subject may be thought unnecessary: but seeing that the latter cannot be accomplished in some situations, by any of the ways already pointed out, at least without such an expense being incurred as to render it impracticable, other means have therefore been successfully resorted to, by sinking water into the earth beyond the reach of injury. With respect therefore to the draining of land-locked bogs, the first thing to be discovered is, whether the bog proceeds from the accumulation of surface water or the overflowing of springs from the surrounding hills, or from springs lying underneath the surface: as to the method of draining, each differs as widely as the causes from which they proceed. Such an essential discovery can at once be made, by first sinking a pit two or three feet deep, which will soon fill up with water, and then commence boring with the auger through the retentive stratum,*

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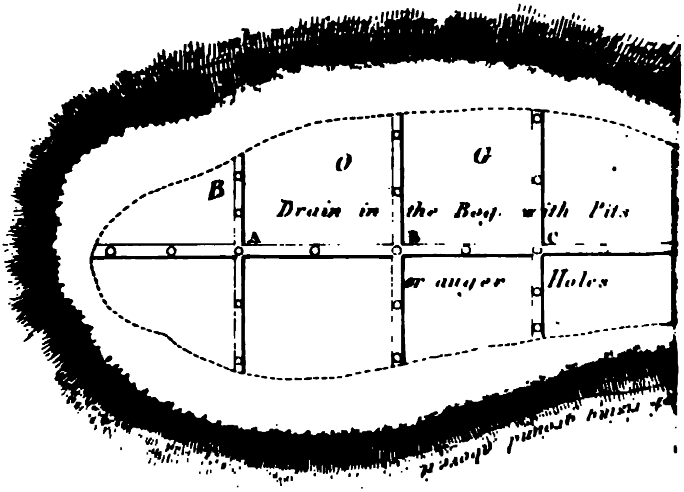
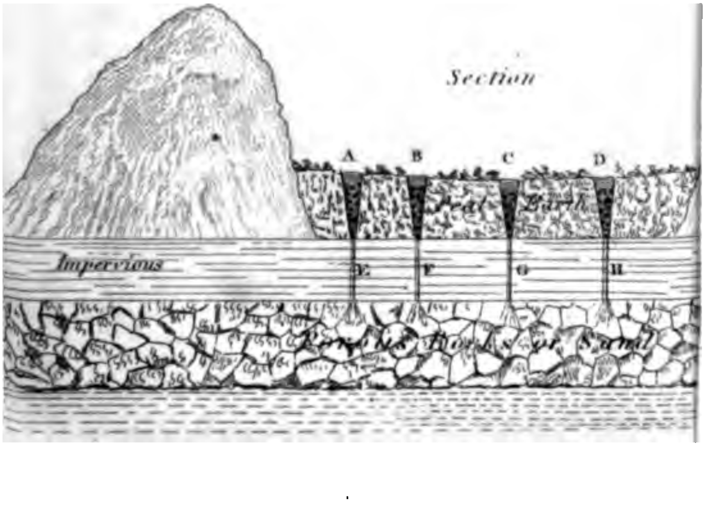
* In attempting to make the above discovery, it is better to use the auger than to sink pits; for when the perforating proves injurious, the auger holes are not only more easily stopped up than the pits, but the experiment can be made with less trouble and expense: it must however be remembered that, after boring fairly through the retentive stratum, the perforation must be no deeper, as it will sometimes happen that water may be thus absorbed; whereas, if the perforation go through a second retentive layer, water will be accumulated.

PLATE XII.

No. 5.





(which is generally the foundation of such bogs,) and after the auger has penetrated into the porous stratum below, should the water in the pit seem to increase, the evil must therefore principally proceed from underneath, at least boring or sinking pits will rather increase than remedy the evil: but if the water in the pit quickly or gradually subside, the bog must then be formed from the accumulation of water from the surrounding high ground; and boring or sinking pits in the bottom of drains will prove an effectual cure; in short, bogs formed upon high situations, surrounded with rising ground, will in general admit of a cure by perforating through the retentive body of clay below the soft porous substance: but when the bottom of bogs are on a level with surrounding low ground, the sinking of pits, &c. would almost invariably accumulate water instead of removing it, in which case the only remedy is to make ponds to collect the water; which, by being made a considerable depth and width in the centre of bogs, may, in some cases, prove effectual.* But suppose a bog proceeds from the accumulation of rain or spring water from the surrounding hills. First cut a main drain through the middle or lowest part of the bog, with which side drains must be made to communicate, of such a number, and running in such directions, as the extent or surface of the bog may require,† being cut through the wet spongy substance above, and a few inches into the retentive stratum below; and perforations made with the auger, or pits sunk occasionally in the bottom of such drains,‡ to give a vent downwards to the water, which will be absorbed by the porous rock or sand as in the section to plate, No. 5. Such drains may afterwards either be filled up with loose stones, &c. or left open as the nature of the soil may require or admit, as marked in the above section, where A, B, C, D, represents the drains filled with stones within about one foot and a half of the top, and E, F, G, H, the perforations with the auger through the impervious clay into the porous stratum. Should there be an outlet to such bogs, but so far above the level as it would not be practicable to cut, and a considerable extent of rising ground above it; a drain cut all around the bog, upon a level with the outlet, might greatly benefit the hill side, and lessen the quantity of water to be sunk through the auger holes or pits. (See drain and outlet marked around plate, No. 5.) The draining of such bogs can only be effected during very dry weather in summer, and even then it will be sometimes necessary first to sink a large pit upon some dry spot, to remove some of the superfluous water, before drains can be made. But the evil may occasionally proceed from the accumulation of rain and spring water from the surrounding high grounds, although the bottom of the bog may be considerably above the level of the low grounds on the other side of the hills with which it is surrounded; and, in which case, perforating through the first stratum of clay may rather increase than diminish the quantity of water, as it might be giving vent to a bag full of water, as formerly noticed in page 393: but when the bottom of such a bag lies below a bog to be drained, the bag must be perforated through, which will prove effectual, provided it can be properly accomplished: and, in this manner, may supposed springs, lying under the surface of bogs, be removed.

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* The above is the only remedy for draining land of every description which has no descent, and where perforating brings up water; but it is sometimes preferable to make small enclosures, surrounded with wide ditches, instead of ponds, to hold the water which may accumulate.

† See plate, No. 5.

‡ Pits filled up with stones are generally more effectual and durable than auger holes; indeed making one or more large pits down through the retentive substratum, in the lowest parts of the main drains, will, in general, be sufficient; which will be a saving of labour and expense.

But the porous substratum below the impervious body of clay may be so deep and full of water as to render the perforating farther either ineffectual or not practicable; in which case, the bog may be drained in the following manner. " If the surrounding high ground declines deeper or lower than the bog, although at some distance, by means of a spirit-level and the appearance of the surface, the nature of the under stratum may, in a certain measure, be discovered; and although it should already contain water, a drain can be there cut to draw off that water, and also what is let down to it from above,"* as at letter K, in section to plate, No. 5. Upon the same principles as have been already described for draining land-locked bogs, may all level grounds, where no descent can be obtained, be drained; which is much practised in draining the marshes in Germany.*

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* See Mr. Johnstone on Draining, page 54.

Having in this chapter been as explicit as the limits of this treatise will admit, on such various modes of draining as may most commonly demand the farmer's attention, I trust that these remarks will at least prove useful to all who may be satisfied with merely having a proper idea of the ordinary purposes of draining; and to those who wish more enlarged views on the subject I would recommend for their perusal Mr. Marshall's Treatise on the Landed Property of England; and Mr. Johnstone's on Draining, according to the system practised by the celebrated drainer Mr. Joseph Elkington, where the art of draining is most minutely discussed, and clearly comprehended by numerous plans and sections illustrative of the subject, and which at once conveys a general idea of the different strata of which the earth is composed, their various situations and inclinations, a thorough knowledge of which must be the *hobby-horse* of all who wish to claim the title of a *finished drainer*.

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* See Dr. Nugent's Travels through Germany in 1766; extracts of which occur in Mr. Johnstone's Treatise on Draining, p. 55.

CHAPTER X.

IRRIGATING LAND.

SECTION I.

INTRODUCTORY REMARKS.

ALTHOUGH it was shown in the last chapter that the advantages to be derived from removing superfluous or stagnated water from land are very great, yet they are equally so when water can be made to overflow land, and thence removed from it quickly and at pleasure. Accordingly, it may here be stated that water is a good servant, but a bad master.

That the utility of irrigation is not more generally known, and consequently the practice of it become more general throughout the kingdom wherever there is a command of water which could be made to overflow the adjacent lands, must appear to every minute observer to be a matter of great surprise, particularly when viewing the high estimation in which it stands,* and its never-failing and durable success throughout the various counties in England, wherever it has been judiciously and properly executed: and that these improvements have not found their way even into the most remote parts of Scotland, must likewise appear an event of considerable surprise, particularly as they seem to be of such ancient standing; for we are informed by a correspondent in the Monthly Review for October 1788, that watering of meadows was practised during the reigns of Queen Elizabeth and King James I. and that a treatise was written on the subject by one Rowland Vaughan, who seems to have been the inventor of this art, and practised it on a very extensive scale in the Golden Valley in Herefordshire. But previously to this account having been given in the Review, Mr. Wright, in his treatise on the subject, informs us that the inhabitants of a village called South Cerney, in Gloucestershire, had assumed the honour of the invention to themselves upwards of a century ago. It would therefore appear from such circumstances that the spreading of so valuable a discovery must have been checked by the unsuccessful attempts of some injudicious performers, or the execution of the extravagant bounds of theory. But as the information afforded to the public by the above author, and Mr. Boswell's valuable Treatise on Watering Meadows, 4th edit. 1801, 8vo, and many others, might now tend to remedy the former, while the latter is an evil which generally cures itself; I trust the period is not far distant when every small brook or rivulet will be as keenly sought after, and as highly appreciated, for their beneficial effects on the improving of the quality of land, as some of them have of late been, in the Highlands of Scotland, for the convenience of making and improving the quality of whisky. But as a great number of years have now elapsed since the appearance of the above valuable treatise on this subject, and the many other useful hints and satisfactory experiments now on record, without having had the effect of making irrigation either generally known, practised, or sought after, particularly in Scotland; it is much to be feared that it is now more necessary to make some additional remarks, in order to convince the great proportion of the inhabitants in Scotland of the numerous advantages resulting from irrigation, than to make additional ones relative to the manner in which it ought to be executed. But as to the former, I must at present decline entering minutely into particulars; and indeed I conceive it would be a vain attempt to endeavour to substantiate, even by the most plausible reasoning, that which must be so clearly demonstrated by the effects of nature to all who may be possessed even of a scanty portion of common sense, with their eyes only half open to conviction. For I would ask the farmer who even possesses one of the most barren tracts of land in Scotland,* if spontaneous proofs of the value of flooding land are not daily staring him in the face, upon the banks of every brook which are occasionally overflowed, or even upon the courses of the smallest rills, which do not produce current enough to form beds for themselves, but at times spread over the sides of hills, leaving invariably green tracts behind them, which were formerly covered with heath or other coarse herbage? I would further ask such a farmer if such pieces of ground, which are accidentally covered with water, do not form a striking contrast to the surrounding waste, by the beautiful verdure which they have thereby acquired? But if such changes are not perceptible, and their value not properly appreciated by such a person who occupies the land, they are invariably so by the animals which graze upon it; indeed, the unquestionable preference which they give to feeding upon such spots of ground, does, of itself, call loudly for the farmer's attention to search into the cause, and estimate the value that he might receive by using his endeavours to increase the number of favourite spots for his stock to graze upon; for if such trifling overflowings from brooks, or the partial spreadings of small rills, effect such a visible change upon the herbage, what would be the advantages resulting from whole streams being at times dispersed over large tracts of surface. It will only be doing justice to irrigation, and I trust prove a stimulus to the practice of it, to here give a brief statement of its numerous and valuable effects. The proper application of water upon meadow or pasture lands produces, 1st, An almost certain and abundant crop of hay or grass, at least one month or six weeks earlier in spring than any other improvement, being advantages which can only be properly appreciated by those farmers who may feel the effects of the want of a proper supply of winter food for their stock, and those who may have early lambs either from choice or chance. 2dly, It produces a supply of the above crops in seasons when the expected returns of all other improvements are burnt up from the want of moisture, in such situations where a command of water can be had in all seasons; in short, it will convert the surface of a dreary heath into a covering of beautiful verdure, and in such situations where no other improvement would either be practicable or equally efficacious. But where irrigation may be said to excel most, is in the annual supply that it affords to the dunghill, without ever being the means of reducing it; which is not the case with most of the other means used for raising crops of hay or grass. Hence we may draw from the preceding remarks that irrigation is the increase of live stock, manure, corn, and vegetables, which must ultimately increase the quantity and improve the quality of arable land; and in proportion as it is improved will the quality of water be which runs through it, particularly when occasioned by violent rains. Consequently the above effects of irrigation will be kept in a progressive state of improvement, and this must be acknowledged to be a forerunner of the increase of capital, which is less or more a stimulus to exertion and industry, and the prompter to all improvements. If such visible facts as those which have now been pointed out are not sufficient inducements to encourage the farmer to lay hold of treasure when made to flow through his land in streams, I must here leave his ignorance or indolence to flow along with it, and proceed to make a few brief and suitable remarks relative to the proper method of irrigating land, to those who may not doubt its beneficial effects. As this volume is already swollen considerably beyond the original intention, I therefore must forbear entering so minutely into all the particulars on the subject as might have been wished or looked for by one who wishes to be an adept in irrigation. But I must beg leave to refer such a one to Mr. Boswell's treatise already noticed, and will therefore here only endeavour to explain a few simple modes best adapted for the irrigating of land which seems so situated by nature as to require neither much capital nor ingenuity to effect it. Many such places I have repeatedly viewed and surveyed, in various parts of Scotland, but more particularly in the Highlands, with considerable regret, and frequently pointed out the advantages which might have been obtained at a trifling expense, by occasionally overflowing the lands with water which was as it were brought to the spot on purpose. But being a professional person, I therefore felt a delicacy, and invariably avoided urging the operation, particularly when the proprietor or tenant seemed to view it in a speculative light; which I am sorry to say was too frequently the case. But as it is my present intention to endeavour to explain the irrigating of such places, in such a manner as the work may be finished by the superintendence of those who may never have seen it executed, and so as the aid of a professional person may be dispensed with; this I trust will remove all ideas of self-interest on my part from those unto whom I have and may recommend to try the experiment: and likewise if such a barrier were at all general, that the present simple explanation will tend to remove it, and make way for one of the greatest and most valuable improvements which can now be introduced into the various parts of Scotland where it may be at all practicable.

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* Those who may not have witnessed the beneficial results of irrigation, may see satisfactory accounts in the Complete Grazier, p. 316; Young's Travels, vol. ii. quoted in Forsyth's Agriculture, vol. ii. p. 169; the Reverend Mr. Wright's Treatise on the Floating of Meadows, quoted in Forsyth's Agriculture, vol. ii. p. 121.

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* In such a situation the water may justly be said to contain the smallest portion of the fertilizing quality; and if its good effects are visible, what must be the consequence when that of a more fertilizing quality is applied to land.

SECTION II.

SITUATIONS AND SOILS MOST SUITABLE.

All situations or soils may be said to be suitable for irrigation, where the land can first be made completely dry by draining, and where a sufficient command of water can be had, and made to quickly overflow it, and as quickly to flow from it; such as near the banks of quick-running springs, brooks, &c.* where the water courses are higher than the land; or rivers with level banks which never overflow, but are constantly confined to their proper bounds. But the improvement in general is much greater and accomplished at less expense, in the former situation, as the land so situated can most frequently be made quite dry by draining, and likewise quickly so after it has been flooded; which are two principal keystones to any improvement made by irrigation. In the latter situation such can only be accomplished in general with great difficulty and expense, and seldom then to perfection. But the trifling expense with which water can be conveyed over some land, may be the means of inducing the inexperienced irrigator to make trials where he ought not;† and hence may occasionally a check to the importance and spreading of irrigation arise, from sheep being infected with the rot when allowed to graze on such watered meadows in summer or autumn, or the falling off of condition among neat-cattle in winter, by the rejecting of hay raised from such injudicious môdes of irrigating.‡ Although most soils may be improved by watering, yet some will be infinitely more so than others; which arises principally from the tenacity or situations of some soils not admitting of a proper drainage: for experience has fully proved, and which will be most readily admitted by all practical irrigators, that all porous soils of a warm nature are more benefited by the effects of flooding than cold tenacious clay soils;[*] which must evidently proceed from the want of the water being properly extracted from the soil, as is clearly demonstrated by the abundant crops which irrigation produces upon such cold clay soils, assisted by a warm spring, when the heat causes the superfluous moisture to exhale. It must however be remembered, that cold clay lands or bogs require a greater body of water, and of a superior quality, to be thrown over them, than a porous warm soil, to have any thing like the same effect.[†]

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* Although water in a large river in general contains most rich sediment, yet brooks or springs are mostly used from their being easier and much cheaper to turn over the lands. See Boswell, p. 6, 8.

† Although attempting to improve the quantity or quality of herbage by irrigating land so situated as not to admit of being thoroughly drained, is quite contrary to the maxim on which it is founded; yet, in such situations, after every effort has been made in order to drain them, and when they still remain the greater part of the winter a complete bog, still by completely covering such places with water during severe frosts in winter, will greatly increase vegetation in spring, as may be observed from transient pieces of such bogs being completely covered with water, and frozen over for weeks, that immediately on the water disappearing from the surface it appears to be covered with a beautiful verdure, while such parts as are completely satiated with water, but not covered during severe frosts, will appear quite dead and fruitless.

‡ The bad effects produced from such modes of irrigating, however, proceed most frequently from letting muddy water flow over the land when vegetation is far advanced, which consequently injures the hay crop, by lodging sand, &c.; and the injury received from grazing such lands proceeds from an improper kind of stock being admitted at an improper season. The seasons for watering and grazing will be fully explained, as likewise the most suitable kind of stock for such pastures, in some subsequent sections.

SECTION III.

WATER MOST SUITABLE.

Much might be here stated with respect to the quality of the different kinds of water which are to be had for irrigating, which no doubt must improve land in proportion to the unctuous sediment which it contains; but that the purest uncompounded fluid in certain proportions[‡] and seasons encourages and promotes vegetation, every seasonable shower of rain which falls is a convincing proof. But a meadow annually cut for hay, and flooded with water possessing merely the power of forcing vegetation, without adding to the quality of the land by depositing rich sediment upon it, must rather be impoverished than enriched by irrigation, and consequently must require the aid of some manure to support the hay crop.[*] This, however, does not hold good when land is grazed instead of being cut for hay, as here the forcing of vegetation, in whatever way, will ultimately enrich the soil; for in proportion as vegetation is increased, so will the quantity of the stock be, and consequently more manure will be thereon deposited. I am however of opinion that, in most situations where such a command of water can be had as to make irrigation at all eligible, seldom such water as has been described will be met with for the raising of hay crops, land adapted for this purpose being in general situated low, and when flooded in time of heavy autumn or summer rains, such water, even from the most barren high grounds, must contain a quantity of manure produced by sheep or some putrescent matter. But let not the quality of the water deter the Highlander from the experiment, when he again reflects upon the early and constant forcing of vegetation upon the traces of water issuing out of a spring situated in the most barren soil; which must plainly show him that even poor water kept occasionally moving upon land, does less or more tend to promote and increase vegetation: but when no favourable symptoms appear on ground occasionally inundated, the experiment of irrigation ought to be very limited until the quality of the water is properly ascertained.[†] How the filtering of water on land increases vegetation, may naturally be supposed to arise from a constant or regular supply of moisture; and how it produces a premature vegetation, might not be an unnatural conjecture to suppose that it proceeds from a degree of warmth contained in spring water, or caused by the constant friction of water: but this is a philosophical question which I do not pretend to solve, neither is it necessary that the irrigator should be able to do so, it being sufficient for him to know that water has such an effect. However, that a distinction ought to be made with regard to the kind of water most profitable when a choice is at command, must be obvious, as reason points out, and experience has clearly proved, "that the more turbid, feculent, and replete with putrescent matter the water is, the more rich and fertilizing it proves,"[*] and that such water is both meat and drink to land. Hence, it must follow that water collected in time of great rains, accumulated in rivers or brooks of a long course through a cultivated good soil, or the washings from farm yards, towns or villages, collected even by a short course, must be preferable in proportion as it has shared of these advantages; and the water so collected by the first great autumnal rains must evidently be the best.[†] When water is not so thickened by heavy rains at some of the allotted periods for turning it over the ground, it is customary, in some places, to hire men to disturb the water in brooks, ponds, or drains, with hacks made for raising up the mud; which is continued during the time of irrigation. Lime is frequently mixed with the water, and is certainly highly beneficial, particularly when the water may be poor, or when pure water is most advisable,[‡] as it is in the spring or summer, merely to moisten the ground so as to increase vegetation.

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[*] Mr. Boswell states, that such soils, when there happens to be a descent from the river, make an almost instantaneous improvement. The ancient writer Blythe states, that upon such soils the advantages are greater and more certain than from any other mode of husbandry, and can be obtained at the least expense.

[†] See Boswell, p. 7.

[‡] Different plants require different degrees of moisture, but some is absolutely necessary for all.

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[*] The increase which irrigation makes upon the stack-yard, will fully repay the necessary infringement on the dung-hill.

[†] It is affirmed by some chymists that water passing through any stratum of a calcareous nature, will, upon most soils, promote the growth of plants, but if through metallic ones, or earth impregnated with the vitriolic acid, it will render the land unfertile, if not wholly barren. But scientific irrigators will tell you that almost any kind of water will produce a good effect upon land, except such as is highly putrid, and that in some degree in proportion to the briskness of the motion.

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[*] Mr. Wimpey's opinion: see Annals of Agriculture, or Forsyth's Agriculture, vol. ii. p. 144.

[†] Mr. Forbes, in his Treatise on Watering, states that "the water should be let in upon the meadow in November, when the first great rains make it muddy, for then it is full of a rich sediment, brought down from the lands of the country through which it runs, and is washed into it by the rain; and as the sediment brought by the first floods is the richest, the carriages and drains of the meadow should all be scoured clean and in order, before these floods come."

[‡] To irrigate meadows or pastures in time of floods, when the herbage is long, frequently injures the quality of the produce, from the accumulation of sand, &c. and is consequently rejected by all kinds of stock, either as summer or winter food.

SECTION IV.

PROPER SEASON FOR IRRIGATING, THE MOST SUITABLE QUANTITY OF WATER TO BE USED, AND THE PROPER PERIODS FOR PUTTING IT ON AND OFF THE LAND.

In the last section it was stated, that experience had clearly pointed out the best kind of water for irrigating, and the benefits resulting from it. But experience has likewise proved, that even the very best water is injurious to vegetation if not put on and off the land in due season; which must vary according to soil, climate, and season of the year. However, the most common time for commencing irrigation, is in November; but the first autumnal floods ought more strictly to be the period for commencing, provided it does not interfere too soon with the grazing of stock, as the water then contains the most fertilizing particles, as has been already shown. In order to secure such valuable water when it happens to come too soon, and to lay up a store for refreshing meadows or pastures in a dry scorching spring or summer, great expense has been incurred in making reservoirs to contain water for that purpose, the advantages of which, in some counties and situations, have been very great.[*] But in many parts of Scotland, the advantages resulting from a reservoir may be had without much expense in making one, as it is not uncommon to find a natural basin into which the surrounding or adjacent rivulets might easily be turned. Such basins, however, are most frequently to be found in the Highlands of Scotland, where the inhabitants will tell you (and with some degree of propriety) that they have no need of such, having, in general, too much rain; which is no doubt the case in certain seasons; but that they do suffer, and that most severely, in some seasons and situations for want of moisture to the meadows and pastures, must be generally admitted, as their pastures are much sooner and more severely affected from the want of rain, when such does take place, than in situations where one half the quantity does not fall throughout the year. This no doubt may be accounted for in some degree from the great declivity that is in such places, although I conceive it principally and more generally proceeds from the frequent rains having encouraged the growth of such plants as are most congenial to such a constant supply of moisture; consequently they must be sooner and more severely affected by the want of it. The necessity or advantage of making reservoirs for the containing of water for irrigation, must be best known and only necessary to those who may have been so situated as occasionally to have felt the want of them. Bogs or clay soils require a heavier body of water, and which must be allowed to remain longer upon them than on light warm soils; but water ought never to flow more than two inches deep, nor less than one, except in warm months. The heaviest body of water should be admitted the first watering, in order to firm the land, which is of the utmost consequence in increasing the quantity and quality of the grass; but during winter, when water is to be had in abundance, a regular even sheet of it ought to flow over the land, such as will cover it all at once with a sufficient current to prevent its searching too deep or stagnating in the soil, but move in such an easy manner as to have time to lodge its sediment at the root of the grass, always avoiding unmanageable floods, which greatly injure land, and frequently run off more fertilizing particles than what they deposite. As spring advances, the quantity of water may be diminished, as it is then more for moisture and forcing vegetation than enriching the land: but in such situations where the benefit of irrigating is more expected to arise from the friction and moistening of water, than from depositing rich particles, the water ought then to go over with rather a brisker movement, as the improvement is in a certain degree increased in proportion to the rapidity of the friction of the water. When water is used in a muddy state or supposed to contain some rich sediment, it is seldom used above twice on the same meadow, as the second running is termed *small beer* by some irrigators, which they say is only capable of quenching thirst, but can give little life or strength to the land.[*] As to the length of time which water ought to remain upon grass, there seems to be a difference of opinion. Mr. Boswell states that upon boggy or strong clay soils a month or even six weeks are little enough for the first watering, but not so long if the soil is sand or gravel; indeed, upon the former, according to his estimation, water cannot well be kept too long, especially in winter, immediately after the grass or aftermath is eaten closely off. But on the latter the water ought on no account to remain long at one time, but be often shifted, the land well drained, and frequently refreshed with the water.[†] The second watering, Mr. Boswell recommends two or three weeks, but not so long after Candlemas, when he thinks two weeks rather too long; and the third watering about one week, supposing it then to be about the middle of March, and the meadows to have a tolerable covering of grass. Sheep may be allowed to pasture until the beginning of May, and as soon as they are removed the water may be turned into the meadow again for about a week; and if more meadows are to be watered after that, the time must be lessened for the water remaining as the weather becomes warmer.[‡] It may be proper just to add, says he, that as soon as the hay is carried off the meadow, cattle of any sort, sheep excepted, may be turned into the meadow to eat any grass that may have been left; after which the water may again be turned into the meadow for two or three days; but if the season is wet, not so long. Mr. Wright, in his treatise on flooding land, conceives three weeks a sufficient time for the water to remain on even the strong clay or boggy land; and that in December and January the chief care consists in keeping the land sheltered by water from the severity of the frosty nights. He further states that it is necessary throughout the whole winter to take the water entirely off every ten or fourteen days to give air to the land, otherwise it would rot and destroy the roots of the grass; and that in February great caution is necessary; for if water is allowed to remain many days without intermission, a white scum is raised, very destructive to grass; and if the water is taken off, and the land exposed to a severe frosty night, without its being previously dried for a whole day, the greater part of the tender grass will be cut off.* The only ways to avoid both these injuries are, either to take the water off by day to prevent the scum, and to turn it over again at night to guard against the frost; or if this practice be too troublesome, both may be prevented by taking the water entirely off for a few days and nights, provided the first day of taking off be a dry one; for if grass experience one fine drying day, the frost at night can do little or no injury. Mr. Wright further recommends at the last-mentioned season, one half the quantity of water to be given to that which is made use of earlier in winter; and after the spring grass is eaten, which should not be later than the end of April, the water may be turned into the meadow again for a few days by way of wetting. Mr. Marshall, in his Landed Property of England,† recommends the following: "Begin to lay on the water in the beginning of November, suffering it to overflow ten to fourteen days, and then take it off. Repeat the same in the months of December and January. In the month of February, give it two waterings of five to seven days each; and in March, three, of three to five days each, according to the state of the air: ever suffering the water to remain on longer in cool, than in warm weather." In the United States of America, the method of watering land from Mr. Strickland's account,‡ seems to be entirely different from any of the above. "The practice of irrigation is known only in two parts of the United States, viz. Connecticut, and that tract in Pennsylvania in which the Germans have settled; but in neither of these places is it carried on to any considerable extent. The mode of applying the water is different in the two states: in Connecticut, it is turned on the land as soon as the weather begins to become warm in spring; but it is not allowed to flow for more than twenty-four hours at a time. It is then taken off for a few days, then turned on again for twenty-four hours, and so on, till the meadow is nearly fit for cutting; immediately after which it is again applied in a similar manner for a second crop, and then again to force the after-grass in autumn; but it is always found to have the greatest effect upon the spring crop. They also apply water to their lands in another very different and unusual manner; they flood great tracts of low meadows, situated on the banks of running water, just before the winter sets in, to the depth of two or three feet, by stopping the course of the stream, and thus let them remain covered till the spring, *in order to keep them warm, and defend them from the frost.* In the following year, these lands produce a considerable quantity of coarse hay, which, in consequence of the fine climate in summer, being very well got, is eagerly consumed by the cattle in winter. After the hay is cut, these fields are pastured for the remainder of the year. In Pennsylvania, the water is usually turned on the meadows about the middle of April, and is allowed to flow about two months; a few days after which, the ground having become dry, the crop is cut. As soon as the crop is off, the water is again turned on for three or four weeks, or till the land get a sufficient covering to defend itself from the sun, which, at that season, is very powerful, and a second crop is then soon ready for the scythe; after which the water is allowed again to flow over it, till within a short time before it is wanted for pasturage, when it is turned off, that the ground may become sufficiently hard to bear the treading of the cattle without injury." But experience must have pointed out to all practical irrigators, that the proper time for grass lands being under water is so fluctuating according to circumstances, that no stated period can be set apart as a general rule. No doubt those mentioned by the above authors will serve to convey some idea or outline for the beginners to walk by, and in the different countries where such gentlemen have had the most experience, their stated periods may even act as pretty sure guides; it having been ascertained by minute observation that one kind of soil has been able to bear water three weeks without injury during the winter months, while early in the spring ten days have been found more than sufficient, and towards the end of April a few days have proved injurious; and other soils in a similar proportion according to their quality. A few years' strict attention to the above particulars in steady climates will, no doubt, point out the proper period for each kind of water remaining upon the various soils at certain seasons of the year. But in the Highlands of Scotland and its adjacent counties, or any of a similar climate, such periods as have been already quoted can be no just criterion, the climate being so widely different.[*] Indeed it is so variable that no exact time for water to remain on land could be ascertained even from the most minute observation and long experience, as it would not unfrequently happen that water allowed to remain on land a certain time in a given month, in one season would prove most efficacious, while in the next season it would either prove ineffectual or destructive: and that in February, when they are frequently in some seasons in England eating off their water-meadow grass with sheep, it would be necessary to allow the water to remain on meadows in Scotland, perhaps as long as at any period during winter, to shelter them from the severity of the weather.[†] But as the exact period mentioned for keeping water upon land

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[*] In Pitt's Survey of Staffordshire, the following note is quoted, p. 159. "At Alicant, the king of Spain has made a reservoir, the water of which, for the uses of summer agriculture, brings him in a revenue of L.2000 per annum. See various parts of Townsend's Travels through Spain, for the utility of such reservoirs."

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[*] Forsyth's Agriculture, vol. ii. p. 140.

[†] Boswell, p. 32.

[‡] Boswell, p. 105, 106.

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* Mr. Boswell apprehends no danger from frost or scum. See Boswell, p. 117.

† Page 237.

‡ Communications to the Board of Agriculture, vol. ii. p. 165.

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[*] In proportion as one climate differs from another, so ought the time for putting water on the ground, and allowing it to remain, be regulated. I have seen some partial and limited spots of ground irrigated, in some parts of the Highlands, by transient English settlers, who were much disappointed in their expectations; but I was fully convinced from their mode of procedure, that the disappointment arose solely from want of taking the difference of climate into account. This no doubt was discouraging to the Highlanders, who did not seem to be aware of the true origin of the mistake.

[†] The advantages of shelter from the severity of weather are clearly demonstrated by the preserved state of vegetation under ice and snow, and its luxuriant increase after a snowy winter

has been regulated by the first appearance of injury, which is readily shown by a white scum collecting upon the land, consequently the same minute attention and observation to this scum, if annually attended to, will prevent such mistakes as might otherwise occur from the changeableness of the climate; for this scum will invariably appear in all countries sooner or later, according to the state of the weather, as it proceeds from fermentation caused by the friction of the water,* which in time ends in putrefaction; and as it commences, vegetation ceases and the scum appears: and in proportion to the degree of warmth of the weather will the fermentation be increased, and consequently the time of putrefaction regulated. Water ought therefore to be instantly removed upon the slightest observance of scum, for if suffered to become general over the meadow, or continue for even a short time, it will be much injured, if not entirely spoiled for the season. The intervals between waterings, preparatory for any particular crop, may vary according to circumstances; in some places a few days are allowed, and in others a week or sometimes two; but it must be strictly observed, that whatever be the period, the land must be made thoroughly dry between every watering, and that as soon as the grass begins to spring, irrigating should cease, unless in some very dry situations or seasons a slight dribbling of limpid water may occasionally be let in to refresh the roots and encourage or force vegetation. All muddy water, or great bodies of any kind should be carefully avoided when the grass is in the above state, as the glutinous substance would adhere to the blades of the grass, and for want of rain at that season, it might not be sufficiently washed off,† so as to make cattle eat it either in hay or grass. Such injury does not take place when irrigating with muddy water in winter or early in spring; the grass being then short, such mud deposited is soon washed into the soil by the frequent rains at that season, and operates as a valuable manure. From what has been already stated, it may be readily inferred that the principles on which the proper execution of irrigation depends are the following: Land to be thoroughly drained, for without this the practice would not be expedient;—having a proper command of suitable water to cover the ground all regularly at pleasure, and an equal command in removing it on the shortest warning, in such a manner as the land may be completely dry in one favourable day;—that a suitable quantity of water may be given according to its quality, nature of the soil, &c. and that it may be removed at suitable periods, which must be regulated by the state of the atmosphere, always being allowed to remain longer in cold than warm weather; but in all cases to avoid the stagnation of it, either in the body of the soil or its surface, and that "the land should be kept in a thirsty rather than a glutted state;"—that muddy water be used only in winter, or when the grass is short and not soon to be grazed or cut for hay, for when moisture is requisite to encourage vegetation, either in spring, summer, or autumn, let it be administered in small quantities of limpid water only;—that the ground is made thoroughly dry between every watering, and the water be removed instantaneously on the slightest appearance of any scum being on the grass, which is a sure indication that the land has had enough at that time. In order, therefore, that such particulars may be executed according to that degree of minuteness which is requisite, I shall now proceed briefly to explain the method of preparing land for the reception and removal of water, and likewise the easiest means of bringing the water to it: but before proceeding to do so, it might first be expedient to describe some of the various instruments and erections (with their technical terms) necessary for accomplishing irrigation in all the situations where it might with propriety be extended.

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* The above scum alluded to, is likewise produced from stagnated water, when the sun is warm and the water clear and thin. The scum at its first commencement has a white, thin, frothy appearance, but at a more advanced and injurious state it becomes thick and gluey.

† Mr. Boswell states in addition to the above, that "at this season, the sun very soon absorbs the watery particles that assist in forming the slime and mud, &c. and leaves the oily substance to which the sand adheres upon the blades; neither will the cutting, making, stacking, &c. shake it off sufficiently for the cattle to eat it."

SECTION V.

INSTRUMENTS, ERECTIONS, TRENCHES, &c. NECESSARY FOR IRRIGATION.

The first most essential instrument is the spirit level, now too well known to require any description: it is particularly useful in doubtful cases to know whether the water can be brought to the land intended for irrigation; but in ordinary cases it is seldom used, as expert workmen find the level by allowing the water to follow them. The only necessary instrument or tool, in addition to those in common use for farm purposes, is a rutting knife (as already described in sect. ii. on Draining) for tracing out the sides of the main trenches and drains: other spades for finishing the work, made on purpose, may likewise be used when neatness and expedition are required, of which the following is Mr. Boswell's description. "The stems are considerably more crooked than any other sort; the bit is iron, about a foot wide in the middle, terminating in a point; a thick ridge runs perpendicularly down the middle from the stem almost to the point; the edges on both sides are drawn very thin, and as they are obliged to be kept very sharp, they are often ground and whet. This necessarily wears away, and they soon become narrow; they are then used for the narrow trenches and drains, whilst new ones are used for the wider. The stems being made crooked, the workmen, standing in the working position in the bottom of the trench or drain, are enabled to make them quite smooth and even." Sluices with hatches in them, such as are used for turning water on and off corn-mills, &c. are requisite for regulating the water for flooding land, and are erected in such numbers and dimensions as may be found necessary. (See W in plan first.) When sluices are erected across rivers with more hatches than one, they are termed wares.

" A *Drain Sluice*, or *Drain Trunk*, is placed in the lowest part of some main, as near to the head as a drain can be found, that is situated low enough to drain the main, &c.: it is made four square, of timber, placed with its mouth at the bottom of the main, and let down into the bank, and from its other end a drain is made to communicate with the nearest trench drain." (See M, plan first.) " Its use is (when the water is turned some other way, to water other parts of the meadow, by means of hatches being put into the ware or sluices where it is intended to prevent its coming through) to convey the leaking water that oozes through the hatches, &c. into the drain, that would otherwise run down to the tails of those trenches which lie lowest, and there poach and rot the ground; and probably contribute, not a little, to the making it more unsound for sheep."

A *Head Main* is a ditch made from the river or brook to convey the water out of its usual course (as A, plan first) to the land intended to be watered, and is made of various dimensions according to the quantity of water it has to convey, and the ground it has to be cut through.

Trenches are narrow shallow ditches, (such as are represented by the letters *c* in plan first) to convey the water out of the main over the land: they should never be made deep, and the width is regulated by the length and the breadth of the panes between them and the trench drains, and must always become gradually narrower to the lower end.*

Trench Drains are made to carry off the water, after it has run over the panes, into a large conducting or tail drain: they ought to be cut so deep as to catch all the filterings of the water from the soil, and a few inches into a retentive bottom, if practicable: they are made parallel to the trenches and width reversed, being gradually wider at the lower end: it is not necessary to make them up to the head of the ground by a few yards. (See representations, plan first, letters *a*.)

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* A trench should not exceed eighty to one hundred yards in length, as when longer the water will not be apt to do justice at the lower end; the width where it joins the main may vary from twelve to eighteen inches, and at the lower end from six to nine inches—depth about four inches: however, they should be made at first as narrow and shallow as possible, for they will always get larger by repeated cleaning; and when too deep they starve the land.

Tail Drains are receptacles for all the water which runs out of the trench drains so situated as not to empty themselves into the river: they ought to be made in the lowest parts of the ground, running as nearly at right angles with the trench drains as the situation will admit, as represented in plan first by Q, S, T.

A *Pane* of ground is that space which lies between the trench and trench drain, consequently there is one on each side of every trench which forms the ground to be watered.

" A *Way Pane* is that part of a properly watered meadow which lies on the side of a main where no trenches are taken out, but is watered the whole length by the water running over the banks of the main; a drain runs parallel with the main to drain the way pane. Its use is for a road to convey the hay upon, out of the meadows, instead of the team crossing all the trenches." The adjoining pane running parallel with the small main RR might do to represent a way pane for the under part of the meadow, provided it were watered from the upper side of the main RR, and the water carried off from it by the adjoining parallel trench drain *a*. (See plan first.)

A *Bend* or *Check* is a stoppage made in various parts of the trenches which have a quick descent, to obstruct the water so as to force it over the trench, and placed at such necessary distances, so that every part of the pane may be equally watered: the double dot in the trenches represents the checks. (See plan first.) Checks are made by leaving or placing a narrow strip of green sward across the trench with a little cut, wedge-wise out of the centre.

A *Turn* of water signifies so much land in a meadow as can be watered at once; which is done by shutting the hatches and all the sluices where the water is to be kept out, and opening those that are to admit the water through them. The quantity of land to be watered by one turn must vary with the size of the river, main, &c. and supply of water; but one general rule will hold good. " To have no more land under water at one time than the stream, &c. can maintain with a sufficient quantity of water regularly; that being guarded against, water as much as possible."

SECTION VI.

GENERAL RULES FOR PREPARING LAND FOR IRRIGATION.

The first most essential point to be ascertained previously to commencing the work preparatory for watering land, is to discover whether the attempt would be practicable or advisable. If the adjacent stream has a constant supply of water which can be made to overflow the land intended to be watered, by raising it a few inches above the level of the highest part of the ground, either by means of running a ware or sluice across the stream, (as at *y*, plan first) or commencing the main which is to conduct the water, so far up the stream (as at W, plan first) as to have a proper descent to the highest part of the ground; and if the water so conducted on the land can be quickly and completely conveyed away from it, it will be practicable to commence the operation, provided that such can be done without injuring your neighbour, or your own adjoining land. The expense of executing the work when compared with the probable advantages that may be derived by taking into account the quality of water, land, &c. will best dictate when irrigation is advisable: and when such is expedient, it may be set about in the following manner.

Having, from a minute examination or by means of levelling, discovered that the land intended to be watered is higher than that part of the adjoining stream most contiguous to it, the consideration then is, whether it will be most advisable to erect a sluice or ware across the stream opposite to the highest part of the land, so as to raise the water to such a level as would answer, or to bring the water by cutting a main as above noticed; which can only be ascertained by comparing the practicability and expense of erecting a ware with that of cutting the main. Should a main be found most advisable, it must have a sluice where the water enters, so that it may be admitted or excluded at pleasure, as at W, plan first. The dimensions of the sluice must be regulated by those of the main, which must likewise be regulated according to the distance it has to go,—the land through which it has to be cut,—and the quantity of water it is intended to convey. Mr. Wright says that "a ditch of ten feet wide and three deep will commonly water ten acres of land." It is however necessary that the water in a main should have a lively motion without either inclining too much to a dead level or a current; for if the former, much sediment is lost for want of agitation, and the main gets foul; and if the latter, the channel will be much injured, and every foot of superfluous fall will contract the field of improvement. Mr. Marshall is of opinion that one inch or foot to every hundred will give an active inoffensive current; but where the length of the channel is great, and the descent given tends to reduce the field for improvement, he thinks one half of the above, or even less, may, in some cases, be eligible.* If the descent to the meadow will admit of the bottom of the main being made on a level with the bottom or bed of the river where they join, it will answer better; as the deeper that water is drawn, more mud it will carry along with it. Such part of the main as communicates with the site of improvement (as BB in plan first) must have the top of its banks level, being a few inches higher than the highest part of the ground to be watered; consequently this height must be level with the lowest part of the bank in the main which may be conducting the water from a higher part of the stream (as A in plan first): and if such a conducting main is preferable to the erection of a ware, (which is most frequently the case when water is to be taken from a large river,) after it has reached the highest part of the site of improvement, whither it ought invariably to be directed, the place where the water flowing in it reaches the edges of the land (as at the point B, plan first) is where a main must be directed from, running in such a manner as the situation of the field may best direct (as BB, plan first) for the feeding of such trenches as will most effectually water the land. If the main have a considerable descent, it will be necessary to place checks in it, to force the water into the various trenches which may be connected with it: and when no trenches are connected with it, but is intended to water a way pane adjoining, it must be contracted, as directed for making trenches, so as to make the water flow over its sides to water the way pane as described in the last section. When the field to be watered is extensive, or with an irregular surface, it will sometimes be necessary to have more mains of a smaller size (as that part of the main BB running parallel with the river, and RR, see plan first) connected with the head main; and if sluices with hatches are erected at the mouth of each, and the water not sufficient to flood the whole at once, it may be done alternately in different divisions, as will be afterwards explained. This method is quite indispensable upon an uneven surface, and advisable upon an extensive plain, both from its being flooded more evenly, and from each part sharing equally of the first run of water, which is in general the best.

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* See Marshall's Landed Property of England, p. 251, 252.

The dimensions of the smaller mains must be regulated by the supply of water requisite for the trenches, but from four to five feet wide may be something like a medium. The next most essential point is the breadth of the panes, which must be regulated according to the nature of the soil, quantity, and quality of the water, provided the ground will admit of such regularity, with a practicable proportion of labour. If the ground is flat, cold, and swampy, or of a boggy nature, it ought to be laid up in ridges from eight to ten yards wide, of a convex form, with a rise in the centre, of about two to two and a half feet; consequently the panes will be from four to five yards wide; but, if the ground is firm, the ridges may with propriety be much wider; from eight to sixteen yards wide, with an elevation of one inch to a foot, may serve to give a general idea: but the above remarks are the best guides for more minute particulars, as both narrow and wide ridges have their advantages according to circumstances. The length of the panes must be regulated by the force or quantity of the water, —from sixty to a hundred yards are a common length. But, in watering ground with a natural sloping surface, such as the side of a bank or hill, the breadth of the panes must be regulated according to the sheet of water forming itself into streamlets, (as it has a tendency to do on such situations,) as, whenever it begins to break, another cut must be made to catch the water and spread it again; hence the trenches act also as drains. During the operation of laying out such ridges on low level ground, which ought to be nearly at right angles with the head main, trenches must be made in the centre of each, and trench drains in the furrows, of such dimensions as described in the last section; or they may vary according to the length, breadth, and declivity of the panes, as in proportion to the quantity of water to be used the trenches and trench drains must vary in breadth.*

The material taken out of such trenches and drains may be applied in the proper formation of the panes; but when land is of an unequal surface, or where it would not be prudent to break up the whole sward for the better formation of the panes, the material may be applied in levelling such inequalities as could not properly be watered or drained, and likewise in forming trenches or mains, as that part of the main BB, (which runs through the hollow ground from the drain Q to the main RR, in plan first,) where it requires to be raised for the more effectual distribution of the water. Trenches ought to be as nearly level on the top as possible, and never to be deep cut, as such is not necessary, it being only the surface water that overflows the side of the trench: one therefore kept full, four inches deep, will cover as much ground with water as one four feet deep; besides, a deep cut is injurious, by the weight of water which it contains forcing deeper into the body of the soil, and thereby chilling the land.† A similar effect is likewise produced by water being left in the trenches, after it is turned off the land, either between the stops or bends, or at the extremities of the trenches when the fall inclines that way: shallow trenches therefore in a great measure remedy such an evil, from not containing much water in such places. But, in order to remove such, and that which may occasionally accumulate from showers of rain, &c. it is advisable to remove the stops when the watering is finished, and either give the trenches a gentle descent into the main or feeder, or, if found more advisable for the descent to run the other way, the bottom of the trenches should be made so deep, where they branch out from the main, as to allow the descent to terminate in nothing, where a stop or check can be placed during the time of watering, if found necessary. The bends or stops must be placed in such places of the trenches as do not seem to overflow their sides regularly or sufficiently; which can only be done with accuracy when the trenches are full of water. However, when the trenches are properly cut with a near approach to a level, and regularly contracted as they proceed, few bends, if any, will be required,* as the contraction will more and more confine the water and cause it to overflow.

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* Mr. Wright states, that a trench two feet wide, and one foot deep, will water a surface twelve yards wide, and forty feet long.

† Complete Grazier, p. 299.

It is sometimes necessary to make small ruts or niches with the spade, (as at the letters *b*, plan first,) branching out from the trenches where the water does not seem to touch or spread regularly over the panes. Mr. Marshall recommends a regulating valve† to be placed at the mouth of each operative trench, so as to admit just a sufficiency of water for the given ridge while under irrigation, and to close the entrance effectually when it is laid dry. The trench drains should next be cut, as described in the last section, one between each trench, with such a declivity as quickly to remove the water into the main receiver at the bottom of the field, so constructed as to lead the water off to the nearest rivulet; (see drain T, plan first;) or it may act as a main to a field which may be irrigated below; for, although the used water may not enrich the second field so much as the first, by lodging rich sediment upon the land, yet it will much forward vegetation, from its friction, or moistening effects.

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* Bends are most necessary when the descent is great, and are less necessary when the trenches are short.

† A lifting board, in the form of a shovel, with a short handle, and sliding in upright grooves, formed in the face of two slender posts joined together within the ground, becomes a simple and eligible regulator for this purpose.

It may be observed, that the method of preparing ground to be watered, which has now been pointed out, is applicable for level ground with an even surface, and that the trenches are cut in straight lines at right angles from the mains, and the trench drains run parallel with the trenches. But, where the surface is more irregular, and has natural elevations and hollows between them, such regularity as has been now described cannot be attended to. The trenches in these situations therefore must be made along the top of such elevated spots or ridges, without regard to straightness or regularity, and the drains made to wind up the hollows with the same irregularity. The true lines for the trenches and drains to run, may here be ascertained by the spirit level, likewise necessary in the last case; or, as Mr. Marshall recommends, "by flooding the entire area, (where this can be done,) and driving down 'levelling pegs' over every part of it, so as to leave their heads uniformly level with the surface of the water, which being let off, the shortest pegs show the proper lines for the trenches, the longest those of the drains." This method, he adds, has been observed in the extraordinary practice of the late Mr. Bakewell of Leicestershire. But, in whatever situation irrigation is performed, the following general rules must be minutely attended to: That the mains, trenches, drains, &c. must be so constructed and kept up, that the water may be brought on and taken off without interruption, and with equal facility;—that during the time of flooding there must be a brisk lively motion throughout the whole surface;—and that as soon as the water is turned off, by shutting the flood-hatches, &c. it may quickly and effectually disappear, not only from the surface, but from the bottom of all the mains, trenches, and drains; ever remembering that stagnated water "rots the turf, soaks and starves the land, and produces nothing but coarse grass and aquatic weeds."

But the plans in the subsequent section, I trust, will illustrate the preceding remarks more fully, and convey some general idea of the different forms, which may be most advantageously and effectually practised in irrigating various situations, to those who may not have either been in the habit of seeing the work executed, or perusing any of the numerous illustrative plates set forth to the public by many of the authors here already quoted.

SECTION VII.

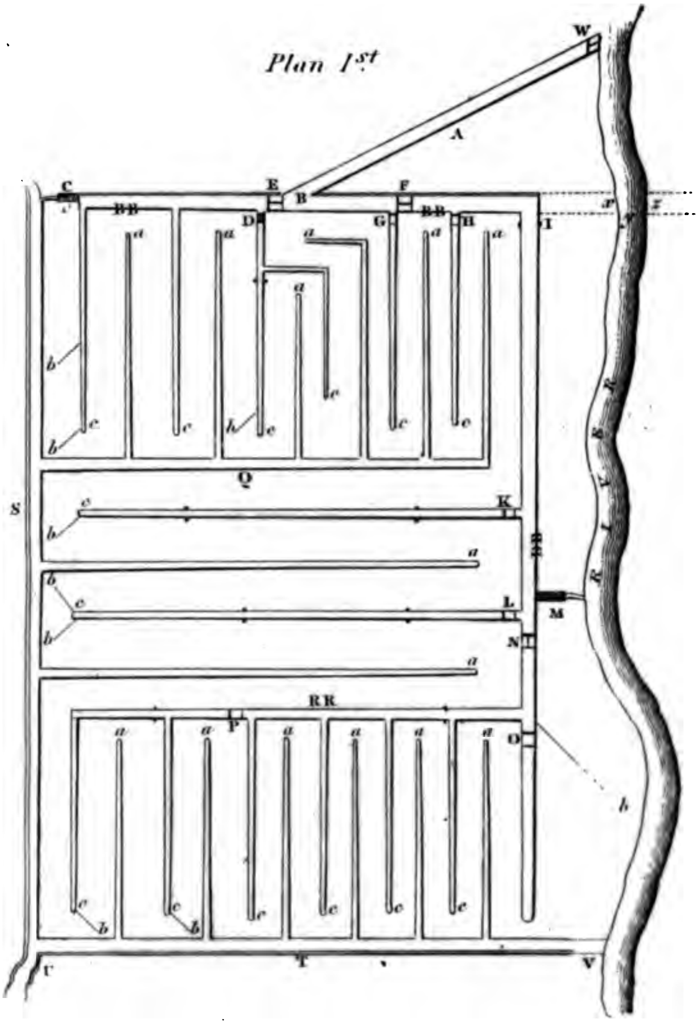
WATERING LOW LEVEL LAND NEAR THE BANKS OF A RIVER, &c.

Plan 1st represents a meadow watered either by a head main taken out of a river some distance above it, or by erecting a ware across the river.

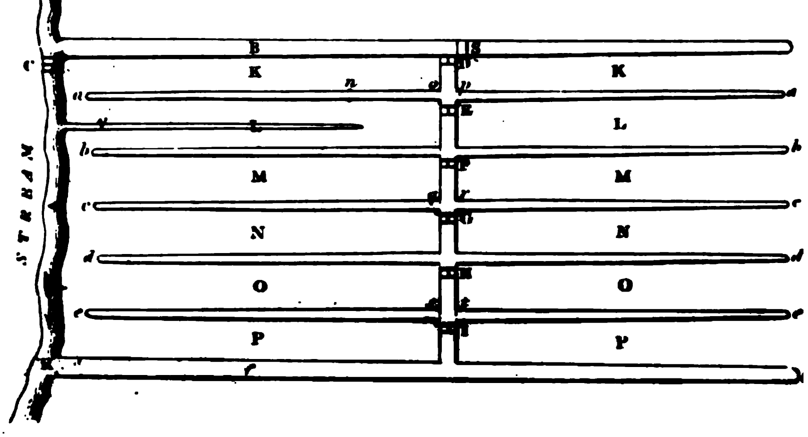
First, supposing the water to be brought by the head main A, taken from the river at W, the descent of the land permits the head main to overflow at the point B, where the meadow can be watered; consequently is the place for the main BB, to be drawn at right angles with the stream the whole breadth of the ground to be watered, excepting a few yards at each end. E, F, two wares erected to turn the water either way; and W, a ware, when open, for admitting the water from the river, and, when shut, to keep it in its natural channel. N, another ware, for the purpose of dividing the meadow into turns. D, G, H, K, L, O, P, sluices to admit the water into or keep it out of the trenches at pleasure; C, M, two drain sluices to carry off the leaking water, or such as may be left in the bottom of the main when the ware W is shut. The dots marked thus : are bends to check the water in such trenches as have the quickest descent, or in places where the water does not seem to overflow its banks regularly. The drains for receiving the water from the panes marked *a*, *a*, *a*, &c. convey the water into the tail drains Q, S, T, which either conduct it through some low ground at U, or empty themselves into the river at V, according as the situation may best admit. The trenches marked *c*, *c*, *c*, &c. receive the water from the mains BB and RR. The lines marked *b*, *b*, &c. are small ruts, made to convey the water

PLATE XIII.

Plan 1st



Plan 2nd



from the trenches upon such places as do not appear to be regularly watered. The reason why the field under our present consideration is not all watered by trenches running in the same direction, is because the space between the tail drain Q and the main RR is supposed to be a hollow plain, which would be too expensive to fill up; consequently, to avoid this, and get the whole field watered from one head main, the main BB is continued down the side of the river till it has passed the flat ground, being there raised with some material, so as to convey the water to O, which, being the high ground similar to that upon the other side of the hollow, the main RR is consequently drawn across the brink of the high ground in a similar direction to BB, the upper main, and the ground below each watered nearly in the same manner. Should the water be scarce, it may be necessary to divide the meadow into two or three turns, as better water one acre well, than two half. The first turn will be made by opening the wares, W, E, and the sluices D, G, and shutting the ware F; the water will then flow over the under side of the main BB, from C to G, down all the trenches that are taken out of it, and will be carried off from the trench drains by the tail or principal drain Q to the outlets at U or V: thus will that part of the meadow be watered; and, by opening the sluice drain C, the water left in the bottom of that part of the main BB, below the level of the trench drains communicating with it, will be removed, and likewise that in the bottom of the trenches, if they have a descent into the main: so by this means the ground will be effectually made dry, (which ought to be the case between every watering,) and all injury will also be prevented by leakages through the ware E when shut for the next turn.

The second turn is made by shutting the wares E, N, and the sluice G; and opening the ware F, and the sluices H, K, L,* that division of the meadow from the ware F to

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* But it must be remembered, that the land to be watered by the opening of the sluices K, L, lies lower than any other part of the field; consequently these sluices must only be half opened, otherwise the water, from not being checked, would run off rapidly through the sluices K, L, and thereby be all drained off from the higher ground intended to be watered through the sluice H

N will be watered, and the panes on each side of the main BB likewise, by the water flowing over its banks as it passes along, which is carried off on the one side by the river, and on the other by the principal drain Q, and the panes on each side of the trenches will also be watered by their respective drains, which empty themselves into the drain and fence S; and opening the sluice drain M, all similar injuries will be removed as when the sluice C was opened after the first turn.* The third turn is made by shutting the sluices H, K, L, and opening the ware N, and as much of the sluices O, P, as to admit water enough to supply the trenches below them, keeping that at O partly shut to turn the water into the main RR, and likewise that at P to check the water, and force it over the sides of the small main RR and its respective trenches; and thus the panes below RR, and the parallel one adjoining it, are watered. The reason for placing the sluice P, is from that part of the ground from it to U being supposed to be lower than any other part; consequently the water, if not checked, would run so rapidly down to the ends of those two trenches between P and U, as to be all drawn off from the high grounds from P upwards. The whole meadow has now been watered, which may be repeated and continued, according to the directions given in section iv.; and when the watering process is finished, by shutting the ware W, and opening all the wares, sluices, and sluice drains throughout the meadow, it will soon become effectually dry, and remain so, provided it has been laid down according to the rules already prescribed.

FURTHER REMARKS ON THE ABOVE PLAN.

In some situations, the ware W may be dispensed with; for, by shutting the wares E, F, the water may be turned into its natural channel; but it would in most cases be advisable to erect a ware at W, to prevent the water stagnating in the conducting main A, which might injure the land through which it runs, or considerable damage might be caused to the meadow below for want of it, in time of floods, by the overflowing or pressure of the water. When the run of water in the river will admit of the tail drains being so cut as to discharge themselves at V, it may sometimes be most expedient to do so, provided there is no ground lying below the drain T, where the water may be again used, as already noticed. But allowing that it would be most practicable to erect a ware across the river at *y*, the conducting main A would then not be necessary; but the main BB, joined with the river at *x*, where a ware must be erected for the same purpose as that at W, when the main A was supposed to be cut. To water the meadow by turns, in this case it may be observed, that it would be necessary to erect a ware across the main BB, at the dots beside I, and that no ware at E would be necessary. The first turn therefore will now be made by shutting the wares *y*, I, and sluice H, and opening the wares *x*, F, and sluices D, G. The second turn by shutting the wares F, N, and opening the ware I, and sluices H, K, L. The third turn by opening the ware N, and shutting the sluices H, K, L, and proceeding, as has been already described, for watering that part of the meadow. In some situations where the ground to be watered is similar to that between the upper part of the main BB and the tail drain Q, and no hollow as between Q and RR, the drain Q may then be continued until it join the river, and the trench and trench drains made in a regular manner as between C and D, until the ground is all laid off to the river, which will act as the last trench drain: such a number of wares and sluices may then be made, as may be found necessary for dividing the ground into turns, being shut and opened in a similar manner to that which has been now described. It may however be necessary to remark, that in the last case here mentioned, if the water, when allowed to keep its natural course, (by opening the ware at *y*,) is apt to flow up the drain Q from the point V,* so as to injure the ground, it will then be necessary to have a sluice at V to be shut when the meadow is laid dry. A difficulty, however, here presents itself, that, although the water, when turned over the meadow, by shutting the ware *y*, may have a free descent through the drain Q into the river at the sluice V, from the natural channel of the river being then dry, or nearly so, by the ware *y* being shut; yet when the ware *y* is open, so as to lay the meadow dry, the water issuing from the drains in the meadow may be interrupted by that in the natural channel, as it will take, even in the best-regulated meadow, some little time to run off. When this is the case, to such a degree as to injure the meadow by stagnated water, the outlet for the water in the tail drains must be at U,† or such part as a proper descent can be obtained; and, failing this, the ground is not favourably situated for irrigation.

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* That part of the turn between the tail drain Q and the main RR, being a hollow, the sluice drain M may not have the effect of removing the water left, or that which may accumulate in the trenches running through the hollow; the bottom of such trenches must therefore have the descent towards the drain S, with moveable checks at the extremities, so as to give the bottom water a free course into the drain S, when the ground is intended to be laid dry.

Such remarks and plans now illustrated may be applied in a similar manner to either side of a stream, or both alternately, by erecting a ware *z* on the river given in the plan; and thus by shutting the wares *y*, *z*, and opening the ware *x*, the ground on the one side of the river may be irrigated; and by shutting *x*, and opening *z*, the other side may be watered.

SECTION VIII.

WATERING LAND UPON HILL SIDES, OR SUCH AS MAY HAVE A QUICK DESCENT, WHERE A STREAM IS RUNNING DOWN THE DECLIVITY; EITHER FOR RAISING HAY OR PASTURING, AS THE NECESSITY OR SITUATION MAY BEST DICTATE.

Plan 2d. We shall first suppose the surface to be even, having a regular descent, with only one hollow in the pane L, where a small drain is cut as at *v*, to remove the water from it. A, the stream running down the hill; C, a ware across it to turn the water into the main B, which is cut at right angles with the stream as high up the hill as the water can be raised, and as far across the declivity as the land is intended to be watered, which we shall suppose to be two panes length; a main must be made from S, (being at the end of one pane's length) parallel with the stream, to the bottom of the hill, wherein must be erected S, D, E, F, G, H, I, small wares or sluices to turn the water into the trenches *aa*, *bb*, *cc*, *dd*, *ee*, which must be cut parallel with the main B, and at such distances from each other, and in such a manner as has been described, (sect. vi. p. 424,) with such a descent in the bottom as that no water may lodge in them when the irrigating may be stopped. These trenches likewise act as drains during the course of watering; *o*, *p*, *q*, *r*, *s*, *t*, are stops not to be taken notice of by the first method of watering about to be described. KK, LL, MM, NN, OO, PP, are the panes or ground to be watered. Supposing the quantity of water sufficient to water the field planned out at two turns, it may be executed in the following manner.

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* The point V is now supposed to be where the drain Q joins the river.

† It is now supposed to be where the drain Q joins the drain S.

First turn. Shut the wares C, D, F, H, and open the wares S, E, G, I; the water will then be forced into the main B, which being filled the full length of the two panes, it will overflow and regularly water the panes K, K, and the upper part of the hollow in the pane L, by placing a check at *n*[*] in the drain *a*, the water running off through the drains *a*, *a*, will be turned into the trenches *b*, *b*, and will water the panes M, M: the water being caught and discharged again by the drains *c*, *c*, into the trenches *d*, *d*, will overflow the panes O, O, and fall into the drains *e*, *e*, and run off by the drain *f* into the stream at R.

Second turn. Shut the wares S, E, G, I, and open D, F, H; the water will then run through one half of the main B into the drains *a*, *a*, (one of which being fully stopped at *n*, to prevent the loss of water through the hollow drain *v*,) passing over the panes L, L, through the drains *b*, *b*, into the trenches *c*, *c*, will flow over the panes N, N, and be caught by the drains *d*, *d*, which will empty themselves into the drains *e*, *e*, and then overflow the panes P, P, and be carried off by the drains *f*, *f*, into the stream at R. Thus are all the panes watered alternately by two turns, which is making the most of a given quantity of water. It, however, may be observed, that the four upper panes K, K, L, L, will reap the most benefit from always receiving the first run of water; but should the water be plentiful, and it deemed necessary that all the panes should have a first run of water, the others may be watered separately, by keeping the wares C, S, and the one upon the upper side of the panes to be watered, shut, and all the others open: thus by shutting C, S, F, all the others being open, will the panes M, M be watered by the first run, and so on until the others have all received the same benefit. But if it is not material about every pane getting a first run of water, which I am of opinion will not be the case in such situations, particularly where grass is to be eaten upon the ground, and not preserved for hay, the plan in question may be watered by two or more turns with fewer wares or sluices; which may be an object when they are troublesome or expensive to erect.* Suppose, then, that there are no wares at E, G, I, and no hollow in the pane L, but that the stops *o*, *p*, *q*, *r*, *s*, *t* are put in and taken out as required during the time of watering. One turn may be made by shutting C, D, H, and the stops *o*, *p*, *s*, *t*; hence will the panes K, K, L, L, O, O, P, P be watered. Another turn is made by shutting C, S, F, and the whole of the stops; all the other wares being open; consequently will M, M, N, N be watered. It may here be observed, that, by the above method, the panes O, O, P, P are watered with reduced water having previously passed over the two upper panes; but this may be remedied, if necessary, by giving them a watering by themselves, which may be accomplished by shutting C, S, H, and all the stops, (with additional ones at F on the mouth of the trenches *b*, *b*) and opening the wares D, F. The watering being finished, all the wares and stops must be opened; the ground and bottom of the trenches will then soon become completely dry by the main which is parallel with the river, and into which the trenches should all have a gradual descent. Should there be more land on the same side of the stream, it may be irrigated by extending the main B, and a similar plan formed on the other side of the supposed fence, which the water will be conveyed to by shutting C, D, and opening S: and land lying on the other side of the stream may in like manner be irrigated, by erecting wares in the stream as directed in plan first, for watering ground on each side of the river alternately.

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[*] The check at *n* should be so placed as to stop no more water than what will be sufficient for the upper part of the hollow, as such water is immediately lost, being conveyed with the drain *v* into the stream A. The same precaution is necessary in the second turn by letting only a small quantity of water overflow the under part of the hollow at the part of the trench *b* which is opposite to it.

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* Temporary wares or sluices may be erected across mains and trenches, with turfs or sods when they are of a stiff retentive nature; which will answer in some situations, and do in making trials of irrigation.

Thus have I endeavoured to explain by the first plan, some of the various modes of irrigating low ground situated near the banks of a river or small stream; and, in the second, given such methods as are best calculated for watering hill sides, or places with a regular declivity:* which, I trust, will serve at least to convey some idea of the art to those who may be entirely ignorant of it, and assist such as may not yet have finished their apprenticeship. But before concluding this chapter, it may not be imprudent to make some brief remarks relative to the precaution necessary for pasturing some kind of land which may have undergone a course of irrigation.

SECTION IX.

METHOD OF GRAZING LAND WHICH HAS BEEN FLOODED WITH WATER.

The advantages pointed out in the subsequent pages, resulting from artificial watering of pasture or meadow land, must be admitted to be very great, and will readily be acknowledged not to be overrated by every one who has tried the experiment; excepting those who may have split upon the very rock which is the primary cause of the remarks about to be made relative to pasturing. That the pasturing of some kinds of watered ground invariably, and almost instantaneously, in the summer or autumn, affect sheep with the rot, but not so in spring,* will appear to some a strange doctrine; but experience has satisfactorily proved that it is no more strange than true. I might here quote numerous and satisfactory instances of the above, but the present limits forbid it; I shall therefore only notice one other striking instance of the sudden and fatal effects which grass in watered meadows, in summer or autumn, produces upon sheep, one of which is recorded in the Sussex Report. "Eighty ewes from Weyhill fair, were turned into some fields adjoining a watered meadow: a score of them broke into the meadow for a night, and were taken out in the morning and kept till lambing; they produced twenty-two lambs, all which lived, but every one of the ewes died rotten before May-day.. The remaining sixty made themselves fat, nor could one rotten sheep be found among them." Mr. Wright quotes an experiment made by a friend of his watering a meadow after the hay was taken off in July, for ten days, with rich muddy water; which was in about a month thereafter covered with uncommon luxuriancy. "Into this grass were turned eight sound ewes and two lambs. In six weeks time the lambs were killed, and discovered strong symptoms of rottenness; and in about a month afterwards one of the ewes was killed, and though it proved very fat, the liver was putrid, and replete with the insect called the *fluke* or *weevil:* the other ewes were sold to a butcher, and all proved unsound." I trust that it is unnecessary to urge upon those who may be tempted to commence irrigation, the propriety of never, on any account whatever, allowing sheep to tread upon low meadows which have been watered in the summer or autumn, and even not at any period, until the ground has been previously dry for a few days. This precaution is however not necessary upon sound dry land which may have been watered, as here you may water in one week throughout the year, and pasture the next, with any kind of stock; but always observing to let the water be completely subsided from the soil to prevent injury by the trampling of the stock. Should the ground have a tendency to become soft from watering, heavy cattle should never be permitted to graze upon it: low swampy meadows which have been irrigated, may be with safety eaten early in spring with sheep, and with cattle in summer or autumn. However, it is found not to be expedient to put any kind of stock upon such meadows before the dew is off the ground in the morning, and not then in a hungry state: they may in general be permitted to graze from ten to eleven o'clock in the morning until four or five in the afternoon, when they must be removed to some house or dry ground, and there allowed to remain during the evening. It is a common practice in some parts of England, but more particularly in Wiltshire, to rail off the meadow grass in spring for sheep in the same manner as is done with turnips; enclosing them on such a portion of grass as they may finish in one day,* leaving spaces for the lambs to get through and feed upon the fresh grass. This is certainly a most laudable practice, as it makes the most of the grass, and manures the field more equally and to greater perfection. However, let no such advantages of early spring feeding be overdone by a too long continuation of it, as later than the month of April is in general attended with a risk of rotting the sheep, and, notwithstanding the injury which may then follow, (as mentioned in chap. vi. sect. 8,) water meadows, if long pastures in spring, generally produce hay of a soft nature, not possessing that nourishing quality which it would have done had it been preserved sooner in spring.† There is likewise another observation here necessary in addition to those given in the chapter and section above alluded to for making hay, viz. that as watered meadows in general produce grass of rather a strong coarse nature, it is therefore necessary to cut it early, which if afterwards well made, it will be of a very nourishing milky quality, and is thereby well calculated for milch cows, or ewes which may lamb before the commencement of grass in spring. I have, however, heard hay from watered meadows much condemned for want of nourishment to cattle, from instances having been quoted of their being reduced to a state of poverty by feeding upon it; but this description of hay will be invariably found to be raised by the admission of muddy water at an improper period,* either from ignorance of the irrigator, or by accidental floods. The hay by this means becomes full of sand, &c. which cattle have a particular dislike to, and will almost starve before they will eat it; consequently the nourishing quality of the hay is too often mistaken for its rejected acquirements occasioned by irrigating unseasonably with muddy water: hence the poverty suspected to be caused from eating the hay, proceeds from not eating it at all.

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* Similar methods to the above are practised in Gloucestershire, where they are called "catch work," from the lateral drains catching the water and re-spreading it over the surface.

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* Mr. Boswell, in his treatise, p. 112, states that "water meadows made from low, boggy, or swampy land, will infallibly rot the sheep at any other season than the spring;—it is not so when made from dry heathy land."

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* One acre of good grass in Wiltshire is considered sufficient to serve five hundred couple for one day.

† For the same reason is a second crop of hay not advisable to be taken from water meadows, as well as its empoverishing effects: the after-math ought therefore to be eaten with milch cows, which is to them in that season equally beneficial, as the grass is to the ewes in spring.

Such are my limited remarks upon irrigation, which it is much to be feared, will be viewed by the experienced irrigator to be very defective in giving the subject that justice to which it is so well entitled, by comprehending all the various situations where it might be extensively and profitably applied, and the particulars necessary to be attended to for the proper and scientific manner in which the work ought to be set about and accomplished. But let such a reader remember, that the original intention of the remarks here made on this subject was merely to comprehend such situations as might be irrigated at a trifling expense,—where the model is blocked out,—the materials brought to the place,—and the most satisfactory symptoms of their good effects amply displayed by nature, loudly calling for the slender assistance of art to accomplish the plan. Such situations are invariably to be met with throughout Scotland, but more particularly in the Highlands. The extent therefore of my subsequent expectations from the antecedent remarks, is merely to give the proprietors or tenants of such situations an itching after irrigation, by letting them first taste of its advantages on very moderate terms; and as their views may be enlarged towards the benefits which might result from the practice, and their situations admit of such being accomplished, they may then extend their knowledge of the art by perusing Mr. Boswell's valuable treatise on the subject, and many judicious remarks and illustrations made by other eminent authors, some of whom have been here occasionally noticed. Should, therefore, the circumscribed view which has now been given of irrigation, be even the means of creating a Scotch appetite for it, the original intention will be fully accomplished.

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* See section iv. in this chapter.

CONCLUSION.

I HAVE, in the preceding pages of this volume, endeavoured to be as explicit and precise upon the various subjects introduced as the limits of the work (and I may likewise add, the limits of my abilities) would allow: still I am sensible how imperfect such a collection of ideas will appear to the person who is in search of refined experiments and calculations to commence his practice upon, or amuse his genius. But without attempting to gratify such improprieties, I have scrupulously borrowed from various authors, and referred to them where it was thought to answer the purpose, but carefully avoided the insertion of all such experiments and ideas, as seemed to be founded entirely on theory, which serve to amuse more than instruct, and prove more frequently a false than a sure guide. Indeed, it was more with a view to point out, step by step, a practical line for the young or inexperienced grazier to pursue, than with the expectation of introducing any thing entirely new to the public, that this work was commenced; being well aware of numerous useful hints on the various subjects having been previously given (although widely and indiscriminately dispersed) in the writings of many eminent and learned authors; many of which would prove infinitely more beneficial to the public if they were expunged of those shades of fancy and theory which so generally prevail among them, and which serve to swell the volumes to such an extravagant size as to prevent the ordinary class of men from benefiting by the many valuable remarks so improperly coupled. Besides, such fanciful pages can serve no good purpose. True it is that their plausibility excites admiration and attention for a time by the brethren of those who write them; but no sooner is the mental scheme reduced to practice, than the volume which contains it is viewed by the operator with an indignant eye, and such pages never were looked upon by the practical farmer with any thing else than an eye of disgust. However, although the ideas of such speculative writers have no doubt misled themselves and others, yet some of their spirited exertions toward improvements and discoveries have not always been fruitless to others, although frequently so to themselves: for the men of less enterprise have cautiously waited the result of many plausible experiments, and discriminated such steps of the process as were attended with beneficial effects from such as were not. Thus has one class of men acquired a store of knowledge at the expense, and sometimes ruin, of another, as it must be evident that more attempts at improvement on the subjects in question have misgiven from a want of minutely discriminating when to stop, than from being founded upon erroneous principles. But though I can flatter myself of having accomplished part of the original design of this treatise, by avoiding speculative notions, and chains of theory unconnected with practice; yet I cannot grant myself the same indulgence by anticipating that I have avoided the insertion of every thing equally unworthy: but I have the pleasant reflection to think that although the one may prove equally useless to the public as the other, yet it will not prove equally dangerous.

'Tis hard to say, if greater want of skill
Appears in writing or in judging ill;
But, of the two, less dangerous is the offence,
To tire our patience than mislead our sense.

I have throughout this treatise endeavoured to illustrate my ideas on the various subjects in as concise a manner as my abilities would permit; and at the same time am fully aware that many sentiments have been inserted which are too commonly known to convey new information, but the omission of them would have disfigured the practical chain, which it was my original design to lay down, by a deficiency of some of its links, which, although trivial, are no less useful in their place. And should the plain undisguised style in which I have delivered my sentiments not bear the marks of the eloquence or method of a professed writer, this disappointment will be repaid in a tenfold proportion, by finding that they are conceived by the public to be the genuine sentiments of a PRACTICAL GRAZIER.

Nor fame I slight, nor for her favours call;
She comes unlooked for, if she comes at all.
Unblemished let me live, or die unknown:
O grant me honest fame, or grant me none.

FINIS.

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